THE BUREAU OF PLANT INDUSTRY

SERVICE MONOGRAPHS

OF THE

UNITED STATES GOVERNMENT

No. 47

INSTITUTE FOR GOVERNMENT RESEARCH

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THE BUREAU OF PLANT INDUSTRY

ITS HISTORY, ACTIVITIES AND ORGANIZATION

THE INSTITUTE FOR GOVERNMENT RESEARCH

Washington, D. C.

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ITS HISTORY, ACTIVITIES AND ORGANIZATION

BY
FRED WILBUR POWELL

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BALTIMORE MARYLAND
1927

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The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

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FOREWORD

The first essential to efficient administration of any enterprise is full knowledge of its present make-up and operation. Without full and complete information before them, as to existing organization, personnel, plant, and methods of operation and control, neither legislators nor administrators can properly perform their functions.

The greater the work, the more varied the activities engaged in, and the more complex the organization employed, the more imperative becomes the necessity that this information shall be available—and available in such a form that it can readily be utilized.

Of all undertakings, none in the United States, and few, if any, in the world, approach in magnitude, complexity, and importance that of the national government of the United States. As President Taft expressed it in his messages to Congress of January 17, 1912, in referring to the inquiry being made under his direction into the efficiency and economy of the methods of prosecuting public business, the activities of the national government "are almost as varied as those of the entire business world. The operations of the government affect the interest of every person living within the jurisdiction of the United States. Its organization embraces stations and centers of work located in every city and in many local subdivisions of the country. Its gross expenditures amount to billions annually. Including the personnel of the military and naval establishments, more than half a million persons are required to do the work imposed by law upon the executive branch of the government.

"This vast organization has never been studied in detail as one piece of administrative mechanism. Never have the foundations been laid for a thorough consideration of the relations of all of its parts. No comprehensive effort has been made to list its multifarious activities or to group them in such a way as to present a clear picture of what the government is doing. Never has a complete description been given of the agencies through which these activi-

ties are performed. At no time has the attempt been made to study all of these activities and agencies with a view to the assignment of each activity to the agency best fitted for its performance, to the avoidance of duplication of plant and work, to the integration of all administrative agencies of the government, so far as may be practicable, into a unified organization for the most effective and economical dispatch of public business."

To lay the basis for such a comprehensive study of the organization and operations of the national government as President Taft outlined, the Institute for Government Research has undertaken the preparation of a series of monographs, of which the present study is one, giving a detailed description of each of the fifty or more distinct services of the government. These studies are being vigorously prosecuted, and it is hoped that all services of the government will be covered in a comparatively brief space of time. Thereafter, revisions of the monographs will be made from time to time as need arises, to the end that they may, as far as practicable represent current conditions.

These monographs are all prepared according to a uniform plan. They give: first, the history of the establishment and development of the service; second, its functions, described not in general terms, but by detailing its specific activities; third, its organization for the handling of these activities; fourth, the character of its plant; fifth, a compilation of, or reference to, the laws and regulations governing its operations; sixth, financial statements showing its appropriations, expenditures and other data for a period of years; and finally, a full bibliography of the sources of information, official and private, bearing on the service and its operations.

In the preparation of these monographs the Institute has kept steadily in mind the aim to produce documents that will be of direct value and assistance in the administration of public affairs. To executive officials they offer valuable tools of administration. Through them, such officers can, with a minimum of effort, inform themselves regarding the details, not only of their own services, but of others with whose facilities, activities, and methods it is desirable that they should be familiar. Under present conditions services frequently engage in activities in ignorance of the fact that the work projected has already been done, or is in process of execution by other services. Many cases exist where one service could

make effective use of the organization, plant or results of other services had they knowledge that such facilities were in existence. With the constant shifting of directing personnel that takes place in the administrative branch of the national government, the existence of means by which incoming officials may thus readily secure information regarding their own and other services is a matter of great importance.

To members of Congress the monograph should prove of no less value. At present these officials are called upon to legislate and appropriate money for services concerning whose needs and real problems they can secure but imperfect information. That the possession by each member of a set of monographs such as is here projected, prepared according to a uniform plan, will be a great aid to intelligent legislation and appropriation of funds can hardly be questioned.

To the public, finally, these monographs will give that knowledge of the organization and operations of their government which must be had if an enlightened public opinion is to be brought to bear upon the conduct of governmental affairs.

These studies are wholly descriptive in character. No attempt is made in them to subject the conditions described to criticism, nor to indicate features in respect to which changes might with advantage be made. Upon administrators themselves falls responsibility for making or proposing changes which will result in the improvement of methods of administration. The primary aim of outside agencies should be to emphasize this responsibility and facilitate its fulfillment.

While the monographs thus make no direct recommendations for improvement, they cannot fail greatly to stimulate efforts in that direction. Prepared as they are according to a uniform plan, and setting forth as they do the activities, plant, organization, personnel and laws governing the several services of the government, they will automatically, as it were, reveal, for example, the extent to which work in the same field is being performed by different services, and thus furnish the information that is essential to a consideration of the great question of the better distribution and coördination of activities among the several departments, establishments, and bureaus, and the elimination of duplication of plant, organization and work. Through them it will also be possible to

subject any particular feature of the administrative work of the government to exhaustive study, to determine, for example, what facilities, in the way of laboratories and other plant and equipment, exist for the prosecution of any line of work and where those facilities are located; or what work is being done in any field of administration or research, such as the promotion, protection and regulation of the maritime interests of the country, the planning and execution of works of an engineering character, or the collection, compilation and publication of statistical data, or what differences of practice prevail in respect to organization, classification, appointment, and promotion of personnel.

To recapitulate, the monographs will serve the double purpose of furnishing an essential tool for efficient legislation, administration and popular control, and of laying the basis for critical and constructive work on the part of those upon whom responsibility for such work primarily rests.

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THE BUREAU OF PLANT INDUSTRY

ITS HISTORY, ACTIVITIES, AND ORGANIZATION

CHAPTER I

HISTORY

The Bureau of Plant Industry, one of the scientific branches of the Department of Agriculture, was organized in 1901 (Act of March 2, 1901; 31 Stat. L., 922, 926) through the combination of six divisions concerned with the problems of plant life in its relations to agricultural production and utilization. The service thus established, therefore, was not a new undertaking, but the successor of a number of related services, some of them antedating the old Department of Agriculture itself. Historically its development may be traced through four distinct periods, which may be termed, anticipatory, preliminary, formative, and developmental.

Anticipatory Period, Prior to 1839. During the colonial period there were repeated attempts by the various governments to encourage the introduction and cultivation of various kinds of plants. Usually these were tropical or semi-tropical plants like sugar cane, indigo, and mulberry trees, which could not be profitably grown in England and which England hoped to get from her colonies, thus ending her dependence on foreign nations. After the United States had been established, sporadic attempts were made by the new government to foster the production of certain plants. In time the emphasis shifted from the introduction of new plants to improvement in the varieties and the cultivation of those which experience had shown were best suited to agriculture in America.

As early as 1802, in a private act,[1] Congress authorized the sale of 2500 acres of public lands in Southern Ohio, with deferred

[1] 6 Stat. L., 47 and 126. See American State Papers, Public Lands, II, 744.

payments and without interest charges, "to encourage the introduction and to promote the culture of the vine." This was the beginning of a movement that resulted in the development of viticulture on a substantial basis. In 1817 the allotment of certain public lands in Mississippi territory was authorized[2] "for the encouragement of the cultivation of the vine and the olive." In 1838 a grant of land in Florida was made[3] "to encourage the introduction and promote the cultivation of tropical plants." In 1838, also, the House Committee on Agriculture submitted a report with a bill to authorize the President to lease gratuitously, for a term of ten years, any lot of land not included in the unlocated or public lands for the cultivation of the mulberry and the sugar-beet.[4]

Following the example of Franklin, who served in England from 1764 to 1775 as agent of the colony of Pennsylvania, American naval and consular officers adopted the practice of sending home seeds and cuttings of foreign plants with the idea of introducing new varieties in this country. This was left to the initiative of individual officials until 1819, when William H. Crawford, Secretary of the Treasury, addressed a circular letter to American consuls, requesting them to send to collectors of ports, useful plants and seeds for distribution.[5]

Foreign plants and trees were placed on the free-list in the tariff of 1816,[6] and foreign garden seeds were exempted from duty in 1842.[7]

In 1830 the House of Representatives requested the President "to cause to be procured such varieties of sugar cane and other cultivated agricultural products as may best be adapted to the

[2] 3 Stat. L., 374; 3 Stat. L., 667; 4 Stat. L., 444 and 611. See 15 Cong. 1 sess., S. doc. 29 (1817); 16 Cong. 1 sess., S. docs. 101 and 115 (1820); 17 Cong. 1 sess., S. doc. 70 (1822); 18 Cong. 2 sess., H. doc. 87 (1825); and 20 Cong. 1 sess., S. doc. 11 (1827).

[3] 5 Stat. L., 302. See 22 Cong. 1 sess., H. rep. 454 (1832); 25 Cong. 1 sess. S. doc. 26 (1837); 25 Cong. 2 sess., S. doc. 300 and H. doc. 375 (1838); also 17 Cong. 1 sess., H. rep. 47 (1822); and 29 Cong. 1 sess., S. docs. 94 and 217 (1846).

[4] 25 Cong. 2 sess., H. rep. 815.

[5] This letter, dated March 26, 1819, is reprinted in full in Watson, History of . . . Western canals . . . together with the rise, progress, and existing state of modern agricultural societies. . . . pp. 205-06 (1820).

[6] 3 Stat. L., 310, 313. See report of importations, 22 Cong. 1 sess., H. doc. 198 (1832).

[7] 5 Stat. L., 548, 561.

climate and soil of the United States," and instructed the Secretary of the Treasury to have prepared, a manual of sugar-cane culture and sugar refining.[8] The manual, a pamphlet of sixty-eight pages, was issued in 1831.[9]

In 1836 the Commissioner of Patents, Henry L. Ellsworth, on his own initiative and independently of his office, undertook to distribute seeds and plants of foreign origin to farmers throughout the country, using for the purpose the franks of certain Congressmen; and in his annual report for 1837 he urged the creation of an agency to receive and distribute such materials and the encouragement of agriculture in other ways,[10] saying:

> Our citizens who are led by business or pleasure into foreign countries, and especially the officers of our Navy and others in public employment abroad, would feel a pride in making collections of valuable plants and seeds, if they could be sure of seeing the fruit of their labors accrue to the benefit of the nation at large. But, hitherto, they have had no means of distributing, to any extent, the valuable productions of other climates, which patriotism or curiosity has led them to introduce into our country. To a great extent they have perished on their hands, for want of some means of imparting to the public the benefit they had designed to confer.

Preliminary Period, 1839 to 1862. The result of this suggestion was an act passed in 1839 (Act of March 3, 1839; 5 Stat. L., 353, 354) granting an appropriation of $1000 "out of the patent fund to be expended by the Commissioner of Patents in the collection of agricultural statistics and for other agricultural purposes." A part of this appropriation was expended in collecting and distributing seeds,[11] a service for which Congress first made specific provision in 1852 (Act of August 3, 1852; 10 Stat. L., 76, 95).[12] In the meantime the Patent Office [13] had been transferred from the Depart-

[8] 21 Cong. 1 sess., H. res. 3 in H. rep., vol. III.

[9] 21 Cong. 2 sess., H. doc. 62.

[10] 25 Cong. 2 sess. H. doc. 112. See also H. docs. 245 and 334 and H. rep. 655 (1838). In 1867 (12 Stat. L., 151, 169) seeds and cuttings were admitted to the regular mails, which had carried nothing but written and printed matter up to that time. This was five years before merchandise was made mailable.

[11] 25 Cong. 3 sess., doc. 151 (1839).

[12] See 34 Cong. 1 sess., S. rep. 236 (1856), advocating the importation and distribution of sugar-cane seed.

[13] The Patent Office, about 1841, took over from the National Institution, a private scientific organization then in liquidation, the botanical collection brought home by the Wilkes Exploring Expedition of 1838. See civil appro-

ment of State to the new Department of the Interior (Act of March 3, 1849; 9 Stat. L., 395). In 1862 (Act of February 13, 1862; 12 Stat. L., 338) Congress appropriated $2000 for cotton and tobacco seed for general distribution under the supervision of the Secretary of the Interior.

Among the plants imported in 1854 and 1855 was the Chinese sugar-cane or sorghum. In 1856 an area of about five acres at Sixth Street and Missouri Avenue, N. W., was set apart for the propagation of sorghum. During the next few years seeds were distributed in such quantities that an adequate supply from private sources was assured, and the distribution by the Patent Office was discontinued, but the propagating garden thus started continued in existence.[14]

For over twenty years after its initial effort in 1839, the principal agricultural activities of the national government were the purchase and distribution of cuttings and seeds and the collection of statistics, but other related objects were provided for from time to time, as is evident from the last appropriation act for the Division of Agriculture of the Patent Office; that for the fiscal year 1863 (Act of March 1, 1862; 12 Stat. L., 348, 350):

For the collection of agricultural statistics, investigations for promoting agriculture and rural economy, and the procurement, propagation, and distribution of cuttings and seeds, of new and useful varieties, and for the introduction and protection of insectivorous birds, and for investigations to test the practicability of preparing flax and hemp as a substitute for cotton, sixty thousand dollars: *Provided, however,* That in the expenditure of this appropriation, and especially in the selection of cuttings and seeds for

priation acts for 1844 to 1850. A "keeper" was authorized in 1844 (5 Stat. L., 681, 691) and a "horticulturist" each year thereafter until 1850, when the control of the collection passed to Congress (9 Stat. L., 423, 427). This was the beginning of the National Botanic Garden. In 1850 John D. Breckenridge was appointed as botanist, and associated with him was Asa Gray. William Robertson Smith became superintendent in 1853 and continued as such for many years.

The systematic improvement of the grounds about the Capitol, long advocated by John C. Calhoun, was undertaken about this time under the direction of Andrew J. Downing, the first great American landscape gardener.

In 1855 (10 Stat. L., 643, 669) the sum of $1500 was appropriated for the erection, by the Commissioner of Public Buildings, "of a suitable house for the plants recently brought from Japan" by Commodore M. C. Perry. See also 11 Stat. L., 81, 86.

[14] Swank, The Department of Agriculture, pp. 19-20.

distribution, due regard shall be had to the purposes of general cultivation and the encouragement of the agricultural and rural interests of all parts of the United States.

Formative Period, 1862 to 1901. In 1862 (Act of May 5, 1862; 12 Stat. L., 387) the Department of Agriculture was created as an independent establishment under a Commissioner reporting to the President and to Congress. The first Commissioner of Agriculture was Isaac Newton of Pennsylvania. As prescribed by the organic act the duties of the new department were to conduct a general information service on agricultural subjects, and "to procure, propagate, and distribute among the people new and valuable seeds and plants." The duties of the Commissioner included the conduct of practical and scientific experiments, the collection of seeds and plants and the testing of such as might be necessary, the propagation of such as might be found worth while, and the distribution of them among agriculturists; and the Commissioner was authorized to employ such persons, including botanists, as Congress should from time to time provide. The department at once took over the propagating garden, for which a Horticulturist Superintendent, William Saunders, was appointed within the year, and from this beginning developed the Division of Gardens and Grounds. The purposes of the garden as outlined by the Superintendent in his first report were three-fold; experimental, such as the improvement of plants by hybridizing, pruning, and special culture; pathological, including the investigation of plant diseases and destructive insects; and æsthetic, including the collection and adaptation of decorative shrubbery for landscape gardening and the display of exotic plants. Relations were established with consular officers abroad, from whom seeds, plants, and helpful information were obtained.

In the first act of appropriation passed after the establishment of the department (Act of February 25, 1863; 12 Stat. L., 682, 691), provision was made for the culture of cotton and tobacco and for continuing the investigation to test the practicability of cultivating and preparing flax and hemp as substitutes for cotton.[15] In

[15] See Report of the Secretary of the Navy on the culture of hemp, American State Papers, Naval Affairs, I, 245-47 (1811); also reports in *ibid.*, I, 1039-49 and II, 27-40 (1825). The matter of utilization of American hemp by the Navy for cordage, cables, and canvas was the subject of numerous reports issued between 1825 and 1856. Following a resolution,

1864 a small appropriation was made for the purchase of sorghum seed, designed to promote production of sugar. In 1864 also, provision was made for a Superintendent of Seed Room (Act of June 25, 1864; 13 Stat. L., 145, 155).

In 1865 an experimental farm was established in Washington on a tract of approximately forty acres at Twelfth and B Streets, N. W. During that year and the following two years tests were made of the merits of many varieties of cereals, grasses, potatoes, tomatoes, and other agricultural products. As many as seventy varieties of potatoes were in cultivation at one time; at another, sixty-seven varieties of spring wheat and fifty-five varieties of fall wheat. The area of the farm proved to be too small to prevent the crossing and mixing of the different varieties and, consequently, it was converted into an arboretum.

The activities of the department in the field of plant industry during the succeeding fifteen years had to do primarily with the operation of the propagating or experimental garden to test new and promising varieties; the distribution of seeds and plants,[16] including a special allotment in 1867 for the purchase of seeds of improved varieties of vegetables and cereals and their distribution in the Southern States (Act of March 30, 1867; 15 Stat. L., 28) and another in 1875 for the distribution of seeds among the sufferers from the ravages of the Rocky Mountain locust (Act of January 25, 1875; 18 Stat. L., 303); the preparation of specimens for the National Herbarium[17] by a Botanist, appointed in 1869 (Act of July 20, 1868; 15 Stat. L., 92, 105), and the investigation of various fruit diseases and the study of mushrooms, both by a Microscopist appointed in 1872, but first specifically provided for by Congress in 1873 (Act of March 3, 1873; 17 Stat. L., 485, 506). A Superintendent of Experimental Gardens was authorized by the act of July 20, 1868 (15 Stat. L., 283, 298).

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adopted in 1841, directing the Secretary to purchase domestic hemp if of suitable quality (5 Stat. L., 467) Congress in 1843 authorized the establishment of agencies in Kentucky and Missouri (5 Stat. L., 648). Between 1826 and 1843 the utilization of cotton as a substitute for flax and hemp in the manufacture of naval cordage, canvas, and clothing and of Army tents was considered in a number of special reports.

[16] In 1870 foreign plants, trees, and seeds were made subject to duty except when imported by the Department of Agriculture or the Botanic Garden (16 Stat. L., 256, 268).

[17] Founded by the Smithsonian Institution and transferred to the Department of Agriculture in 1868.

Beginning with the fiscal year 1881 the appropriations for the Department of Agriculture were made in a separate act (Act of June 16, 1880; 21 Stat. L., 292), a practice which has continued until the present; and a division organization was first set forth in the statutes. Those divisions which related to plant industry were: Seed, Garden and Grounds, Botanical, and Microscopical.

The appropriation act for 1881 directed that three-fourths of the supply of seeds, plants, and cuttings be made available for distribution among the constituents of Senators, Representatives, and Delegates in Congress. The fraction varied from year to year, the final one (fiscal year 1923) being five-sixths. This act also provided for the first of a series of experiments in connection with the culture and manufacture of tea, which were carried on for several years with negative results. These items were continued the following year (Act of March 3, 1881; 21 Stat. L., 381, 382), and a new one was introduced providing for the culture of sugar beets, Provision was also made (Act of March 3, 1881; 21 Stat. L., 435, 453) for the distribution of seeds among settlers on the public lands, whose crops had been recently destroyed by drought and grasshoppers. Under successive appropriations the sugar investigations were continued, special provision being made for the cultural experiments with the view to improving the quality of the sugar-producing plants and bringing new lands into cultivation.

In the appropriation act for 1883 (Act of May 19, 1882; 22 Stat. L., 89, 91) provision was made for the study of the physical properties of cotton fibers produced under different conditions of climate and culture, and authorization was made for two new scientists, a Pomologist and a Horticulturist. In 1886 a Pomological Division was established and the functions of the Botanical Division were first defined: "Investigating the nature of the diseases of fruit and fruit-trees, grains and other useful plants due to parasitic fungi; and . . . experiments necessary to determine suitable remedies for these diseases, and . . . field investigation in the South and West with respect to the discovery and introduction into cultivation of forage plants and grasses suitable to increase the grazing capacity of the arid districts of the South and West" (Act of June 30, 1886; 24 Stat. L., 100). In the same year provision was made for investigation of fibers by the Division of Microscopy. In 1887 a section of Vegetable Pathology was created in the Botanical Divi-

sion (Act of March 3, 1887; 24 Stat. L., 495). In 1888 the Botanical Division was authorized to establish and maintain experimental grass stations and to conduct experiments and investigations with economic and medicinal plants.

The elevation of the Department of Agriculture to "executive" status under a Secretary in the President's Cabinet. in 1889 (Act of February 9, 1889; 25 Stat. L., 659) was accomplished with little change in organization. The new Secretary of Agriculture was authorized (Act of March 2, 1889; 25 Stat L., 835, 840) to continue the experiments with sugar-producing plants so as "to result in the acquisition and extension of knowledge concerning all the processes of the production of cane and beets and the best varieties of the same. . . ."

In 1890 the Section of Vegetable Pathology was made a division (Act of July 14, 1890; 26 Stat. L., 282, 285). In 1891 another special distribution of seeds was authorized for the relief of Western drought sufferers (Act of March 3, 1891; 26 Stat. L., 1044, 1048); and further investigations of fibers indigenous in or adapted to the United States, including their economic growth and preparation for manufacture, were provided for. The fiber investigations were conducted by an Office of Fiber Investigations, under the direction of the Assistant Secretary, until 1898, when they were taken over by the Division of Botany.

In 1895 the Division of Vegetable Pathology was reorganized as the Division of Vegetable Physiology and Pathology (Act of March 2, 1895; 28 Stat. L., 727, 728), and a Division of Agrostology was created for the investigation of grasses and forage plants (*ibid.*, 735). At the end of the fiscal year 1896 the Division of Microscopy was abolished and its functions taken over by the other divisions. The Herbarium was transferred back to the Smithsonian Institution, although the Botanist of the Department was continued in charge.

In 1898 (Act of March 22, 1898; 30 Stat. L., 330, 333) Congress first authorized the Secretary of Agriculture to purchase samples of seeds in the open market, to test them through the Division of Botany, and at his discretion to publish the results and the names of the seedsmen in cases where the seeds were found to be below standard. A similar provision has appeared in all succeeding agricultural appropriation acts. By the same act (*ibid.*, 337) the Secretary was first authorized to obtain from foreign sources, rare and

valuable seeds, bulbs, trees, shrubs, vines, cuttings, and plants for experiments in coöperation with state agricultural experiment stations, with a view to the introduction of promising varieties in this country.[18]

Tea culture experiments were resumed in 1899 (Act of March 1, 1899; 30 Stat. L., 947, 956), and continued for ten years, but the project was unsuccessful chiefly for economic reasons.

By act of March 3, 1899 (30 Stat. L., 1377, 1378), the Secretary of War was authorized to grant from year to year, permission to the Department of Agriculture to use temporarily as testing grounds, a maximum area of seventy-five acres in Potomac Park. As early as 1890 (Act of July 14, 1890; 26 Stat. L., 282, 288), an appropriation had been granted for the preparation of such tract of not over eighty acres in the Arlington estate in Virginia as might be turned over by the Secretary of War for use as an experiment station. By act of April 18, 1900 (31 Stat. L., 135), Congress transferred to the Secretary of Agriculture about four hundred acres of this estate for use as "a general experimental farm in its broadest sense, where all that pertains to agriculture in its several and different branches, including animal husbandry and horticulture, may be fostered and encouraged, and the practice and science of farming in the United States advanced, promoted, and practically illustrated." In 1900 also (Act of May 25, 1900; 31 Stat. L., 191, 198), an appropriation was made to enable the Division of Agrostology to obtain seeds, roots, and specimens of grasses and forage plants for distribution among state agricultural experiment stations to ascertain their adaptability to the various soils and climates of the country. About the end of the year the Office of Seed and Plant Introduction was separated from the Division of Botany and made an independent office.

[18] "I have been repeatedly requested to recommend the establishment of stations or farms at different localities throughout the country, for the purpose, among other objects, of acclimating seeds and plants of tropical and semi-tropical kinds; to which I have always replied that I cannot acquiesce in the propriety of such a proposition, for, apart from the vast immediate expense which such establishments would require, and the host of officers and employees that it would necessitate, I have great doubt whether any practicable result would be attained. Whilst the human system may, to some extent be acclimated to the endurance of heat and cold, and perhaps to resist causes of disease, it is very questionable whether any plant can be acclimated to any useful purpose out of its native environment."—Commissioner Frederick Watts, Annual Report, 1873, pp. 8-9.

Period of Development, Since 1901. In his report for the fiscal year 1900 the Secretary of Agriculture stated that " four Divisions of the Department, closely allied by the nature of their work, have become affiliated and have perfected arrangements for a close coöperation and union along the lines set forth. To this association I have given the name of the Office of Plant Industry." [19] This change received legislative sanction the following year, when in the agricultural appropriation act for 1902 (Act of March 2, 1901; 31 Stat. L., 922, 926), the Bureau of Plant Industry was created to centralize and develop the work which had been done by the Divisions of Botany, Pomology, Vegetable Physiology and Pathology, Agrostology, Gardens and Grounds, and Seeds. By executive order the Arlington experimental farm, the investigations in the production of domestic tea, the work on foreign seed and plant introduction, and the congressional seed distribution were incorporated in the new Bureau. The years that have followed have been characterized by development, both intensive and extensive, generally along lines already established. Thus, in 1901 (Act of March 2, 1901; 31 Stat. L., 922, 928), the first of a series of five annual appropriations was made for an investigation of the commercial fruit districts of the United States for the purpose of determining the relative adaptability of the several important fruits thereto, by study of the condition of soil and climate and of the prevalence of plant diseases therein as related to commercial fruit production, and for the mapping of such districts. From 1902 (Act of June 3, 1902; 32 Stat. L., 286, 291) to 1909 attention was given to the causes of decay in forest timbers and timber used for construction and to the devising of appropriate remedies. In 1902, also, investigations were first authorized in soil bacteriology and plant nutrition; and, in 1915 (Act of March 4, 1915; 38 Stat. L., 1086, 1092), provision was made for the testing of cultures for inoculating legumes and for the publication of the names of manufactures and dealers responsible for any samples found to be below standard. These activities, except those concerned with plant nutrition, were transferred in 1927 to the Bureau of Chemistry and Soils.

Farm demonstration work, begun in 1906 as a part of the campaign against the cotton boll weevil (Act of June 30, 1906; 34 Stat.

[19] P. 76.

L., 669, 695) and later extended outside the cotton belt (Act of June 30, 1914; 38 Stat. L., 418, 422), was transferred in 1915 to the States Relations Service (Act of March 4, 1915; 38 Stat. L., 1086, 1108).

In 1908 (Act of May 23, 1908; 35 Stat. L., 251, 267) the Secretary of Agriculture was authorized to test plants suitable for paper-making, and the following year, plants and woods. From 1910 (Act of March 4, 1909; 35 Stat. L., 1039, 1045) to 1919 the Bureau of Plant Industry conducted experiments with fibrous plants, including flax, straw and hemp, to determine their availability for paper-making.

A number of projects outside the original scope of activities have been undertaken. Thus, in 1906 (Act of June 30, 1906; 34 Stat. L., 669, 680) the Bureau of Plant Industry was authorized "to investigate and encourage the adoption of improved methods of farm management and farm practice"; and out of this service grew the Office of Farm Management in 1915 (Act of March 4, 1915; 38 Stat. L., 1086, 1087). With it went the study of the methods of clearing logged-off lands, with a view to their utilization for agricultural and grazing purposes and to the utilization of by-products. This was a coöperative project, first specifically authorized in 1912 (Act of August 10, 1912; 37 Stat. L., 269, 277), taken up jointly with individual states. It was transferred to the Office of Farm Management upon the establishment of that service. Other similar instances are: The inauguration of the movement for grain standardization (Act of March 2, 1901; 31 Stat. L., 922, 928), taken over by the Bureau of Markets in 1917 (Act of March 4, 1917; 39 Stat. L., 1134, 1163), and of the movement for cotton standardization (Act of May 23, 1908; 35 Stat. L., 251, 256), taken over by the same service in 1915 (Act of March 4, 1915; 38 Stat. L., 1086, 1111); and the administration of the Seed Importation Act of August 24, 1912 (37 Stat. L., 506) as amended April 26, 1926 (44 Stat. L., 325). Under the act of August 20, 1912 (37 Stat. L., 315, 319), the Bureau of Plant Industry has representation upon the Federal Horticultural Board, created to govern the importation of nursery stock. From 1914 (Act of June 30, 1914; 38 Stat. L., 415, 440) until 1924 it conducted demonstrations upon reclamation projects in the West—work now being done by the Extension Service. From 1915 (Act of March 4, 1915; 38 Stat. L., 1086,

1092) to 1927 it continued the soil-fertility investigations formerly conducted by the Bureau of Soils and now carried on by the Bureau of Chemistry and Soils. Since 1915 the Chief of the Bureau has served as chairman of a departmental committee charged with coöperative investigations in the development of livestock production in Louisiana (Act of June 30, 1914; 38 Stat. L., 415, 441). This committee is made up of representatives of the Bureaus of Plant Industry and Animal Industry. Another departmental committee, representing these two bureaus and under the chairmanship of an agriculturist in the Bureau of Plant Industry, since 1917 has been in charge of experiments in dairying and livestock production in the arid and semi-arid regions of the West (Act of August 11, 1916; 39 Stat. L., 446, 491).

Duties of an administrative nature have been imposed upon the Bureau of Plant Industry since 1917 (Act of March 4, 1917; 39 Stat. L., 1134, 1141), by acts of appropriation which have provided that a part of the amount granted therein shall be available for the stated purposes—eradication of citrus canker and of white pine blister rust and destruction of the common barberry—only when an equal amount shall have been provided from sources other than the national treasury.

In 1916 and 1917, in coöperation with the States Relations Service, the Bureau distributed seeds for the relief of flood sufferers in the Southeastern States, the funds being provided through an allotment of $80,000 by the War Department.[20]

During the World War the Bureau, through a committee on seed stocks, undertook to deal with the emergency due to inadequate supplies of seeds, acting as a clearing house for information as to needs and available supplies, and inspecting samples of seeds distributed by the Grain Corporation of the United States Food Administration. Under authority of the National Security Act of August 10, 1917 (40 Stat. L., 273, 274), and supplemental legislation (Act of March 28, 1918; 40 Stat. L., 459, 494 and act of November 21, 1918; 40 Stat. L., 1045, 1048), it received $6,500,000 for use as a revolving fund for the purchase, storage, and sale of seeds to farmers.

Under the deficiency act of March 4, 1923 (42 Stat. L., 1527, 1536), an allotment for the fiscal year 1924 was made to the De-

[20] Joint Resolution of August 3, 1916; 39 Stat. L., 434.

partment of Agriculture " for such exploration of rubber-producing regions and such studies and experiments with rubber-producing plants in the United States, the Philippine Islands, and elsewhere, as may be found advisable." This was made available to the Bureau of Plant Industry, which in succeeding years has received regular appropriations for the continuation of the project.

The most notable recent event in the history of the Bureau of Plant Industry is the suspension of the general distribution of seeds at the end of the fiscal year 1923. This had been foreshadowed by the action of the Department of Agriculture, omitting from its estimates for 1922, 1923, and 1924, a request for an appropriation for that purpose. Thus, after eighty-four years this activity, suitable and justifiable in the early period of agricultural development, gave place to activities better calculated to serve the interests of agriculture in the spirit of modern science.

CHAPTER II

ACTIVITIES

Scientific research is the primary function of the Bureau of Plant Industry. The work, however, is organized not on the basis of the several sciences but with reference to specific crop problems or groups of problems. The unit of work is the project, the scope of which is defined in the item of appropriation or administrative allotment from which it receives its authorization. The project may be, and usually is, divided into sub-projects provided for by sub-items of appropriation or by administrative allotments. The projects may vary from year to year, but the broad general lines of activity have been remarkably constant through the years.

The groups of projects as reflected in the organization of the Bureau are set forth in the following chapter. The activities, arbitrarily classified, constitute the subject of this chapter. These activities have to do with the various plant problems of economic importance, particularly those relating to crop production and utilization. They are concerned with the matter of nutrition of plant life; with the introduction and distribution of valuable seeds, cuttings, etc.; with plant breeding and acclimatization; with cultural methods; with the handling, marketing, and utilization of products; with weeds and plant diseases (including the diseases of forest and ornamental trees) and their eradication and prevention or control; also with certain regulatory and extension matters in the field of plant industry. They are here passed in review without any attempt to indicate their relative importance, either by order of presentation or by fulness of treatment. In the official literature of the Bureau emphasis is always placed upon the work in pathology, which is here considered last.

Plant Nutrition Investigations. The purpose of the plant nutrition investigation is to determine the effects of some of the principal factors of nutrition on the growth, development, and composition of plants and the relative plant food requirements of crops commonly grown in rotation. Particular attention has been given

to plants producing oil-bearing seeds, and also to vetch, clover, beans, oats, potatoes, and corn—crops that fit into rotation with tobacco. The original field of inquiry has been widened to include the influence of environmental conditions, light (both natural and artificial), temperature, and water supply, upon plant development.

It was under this item that the work was carried on leading to the discovery of the almost revolutionary significance of the length of day in determining the time of flowering and behavior of crops and other plants, an explanation that shows why these seasonal plants fit into different latitudes and why different varieties have to be secured if they are to be grown successfully in widely separated latitudes.[1]

The most remarkable results from the light experiments have been obtained in connection with tobacco.

Seed Introduction. As was shown in the preceding chapter, the introduction and distribution of seeds and plants antedated the formal organization of a national agricultural service, but the chief activity under that head—the " Congressional " distribution—has been suspended.

New and Rare Seed Distribution. An allied service is the purchase and distribution of new and valuable seeds to sections where it is believed crop production on a commercial basis can be developed, and also of seeds of improved strains of staple crops. Each year a list of promising varieties is prepared and the sources and available supply ascertained. Members of Congress from rural districts are then advised as to the kinds of seeds available for their respective districts and requested to submit the names of farmers willing to give them a trial under the direction of the Bureau of Plant Industry and to report the results of their experience. Such reports as are received are examined for their information content and for evidence of need of follow-up work.

New and rare field seed distribution as at present conducted has made since 1915 the following important accomplishments:

Hastening the general use and popularity of Sudan grass; widespread use of soy beans, not only through the South by the distribution of new varieties, . . . but also in the Corn Belt and

[1] House Hearings on Agricultural appropriation bill, 1928. p. 191. See also Annual Report, 1924, pp. 34-35.

northward by the dissemination of . . . early maturing varieties, . . . extending the culture of the crop as far north as Oregon, Washington, North Dakota, and Maine; greatly enlarging the area of velvet beans through the quick dissemination of seed of new and especially early maturing varieties; establishing the best available varieties of grain sorghum in the grain sorghum belt; adding to the forage crops of the South. . . .

. . . The distribution of seed of improved varieties and strains of cotton was discontinued June 30, 1923, largely because of State quarantine incident to the infestation of the pink boll worm and other pests and because of efforts in certain localities to establish a single variety in a community.[2]

Seed Testing. The pure seed work includes laboratory investigations into the purity and viability of commercial seeds, publication of information as to the sale of adulterated or misbranded forage-plant seeds, and enforcement of the Seed Importation Act of 1912, as amended 1926.

Samples of seed submitted by individuals or firms are tested for mechanical purity, viability, and longevity and also for identification of adulterants and weed seeds. Studies are made of the quality of commercial seeds and of the processes of seed germination. Field tests are made in some cases to determine trueness to name. Each year agents of the Department of Agriculture purchase seeds in the usual course of trade, and these samples are examined for adulteration and misbranding, the names of the dealers responsible for unsatisfactory seed being published.

This form of publicity has eliminated in a large way the sale of adulterated or misbranded field crop seeds in the United States.[3]

Under the Seed Importation Act, standards are fixed for grain and forage-plant seeds imported for seeding purposes, and the Secretary of Agriculture and the Secretary of the Treasury are named as the officers responsible for applying those standards to shipments from abroad. Samples are forwarded by customs officers to the Bureau of Plant Industry for laboratory examination and report. This requires from ten days to two weeks, during which the consignment is held by the importer under bond. The nature of the report determines whether the consignment shall be

[2] House Hearings, 1926, pp. 247-48.
[3] *Ibid.*, 1927, p. 300.

admitted, recleaned, rejected, or denatured for feeding purposes. Most of this work is done at Washington, but some of it is done in coöperative laboratories located in different sections of the country.

The purpose of the original legislation was to exclude weed seed and dead seed. The amendatory act goes further than this and authorizes the Secretary of Agriculture to determine what alfalfa and clover seed (that is, seed from particular countries or regions) will not succeed under the general agriculture conditions in the country, and to require such seeds to be stained red at the port of entry as an indication of their unadaptability. It also authorizes the Secretary to require the staining of admissible seeds in such colors as will indicate the country or region of origin.

Foreign Plant Introduction. The introduction of new plant species and varieties is one of the most important activities of the Bureau of Plant Industry. Many thousand introductions have been received and distributed, some of which have resulted in new plant industries of great economic value.

Specific introductions are: Durum wheats, special varieties of alfalfa, sorghums, dasheens, yams, casaba melons, avocados, mangos, dates, Japanese mint and rices, soy beans, Swedish oats and barleys, Russian oats, Sudan and Rhodes grasses, Egyptian and Mexican cottons, Spanish almonds, and Chinese cabbage, chestnuts, peaches, and pears.

All importations are opened and examined by inspectors under the Federal Horticultural Board. For each one a permanent record card is prepared, containing all available information. This information is made generally available through a multigraphed bulletin, "Plant Immigrants," issued monthly, and specimens are distributed or put into quarantine, according to the results of the inspection. The information is consolidated and issued in a quarterly publication, "Inventory of Seeds and Plants Imported." All applications for introductions are entered in the records and also the specimens sent out in response thereto. A directory of domestic experimenters and plant breeders and of foreign correspondents is maintained. The foreign correspondents include American missionaries and diplomatic and consular officers.

Plant introduction surveys are conducted to bring together in a comprehensive way for practical use, all available information upon soil, climate, labor and horse power, use of machinery, transportation facilities, present and prospective markets, and regional and community sentiment, with the idea of applying those facts in the organization and maintenance of new crop industries through the introduction of foreign seeds and plants.

The placing of new plant introductions is effected through the various plant-introduction field stations, by correspondence, and by means of special agreements with plant breeders, state experiment stations, superintendents of city parks, and private plant experimenters and breeders. Plant quarantine and laboratory facilities are maintained at various points throughout the country, where the work of handling the specimens can be conducted and developed under controlled conditions as well as in the field.

To explore the plant resources of foreign countries with a view to securing new varieties of plants and information that will facilitate their establishment in this country, and with a view to discovering the wild relatives of cultivated plants useful for cross-breeding, American consular officers. collaborators, members of foreign agricultural institutions, and agents of the Department of Agriculture are sent out on expeditions. Minor foreign explorations are also conducted through correspondence, and by this method an extensive exchange has been developed which has resulted in many important introductions.

Plant Breeding and Selection. One of the chief activities of the Bureau of Plant Industry is the securing of new and superior varieties of plants by breeding and selection. Under this head may be grouped a wide range of individual projects, the lines of distinction between which are in some cases obscure. In some instances a single project relates to several varieties of plants; in others, attention is concentrated upon one. Much of the plant-breeding work is concerned with the development of resistance to specific diseases, and not a little of it is done under projects which deal primarily with pathology.

The work in plant physiology has to do particularly with the determination of the requirements of certain crop plants which are new to this country and especially suitable for introduction on a

commercial scale in the South and Southwest. Studies have been made of the soil, climate, and cultural requirements of the date palm; offshoots have been obtained from Mediterranean sources and planted in regions suitable for their culture. The best methods of propagating offshoots are being developed through experiment, and promising varieties have been originated through breeding.

To encourage Smyrna fig culture, caprifigs have been introduced and the insect necessary for proper fertilization has been acclimatized. Breeding experiments are under way to originate new varieties especially suited to American conditions.

Citrus fruits of hardy, disease-resistant types are developed through breeding from species secured wherever obtainable. Hybrids are tested under field conditions to determine their prospective commercial value.

Development of improved hybrid blueberries, improved methods for producing dates of exceptional quality, and development of the tangelo, limequat, citangequat, and new varieties of the Satsuma group of oranges are among the significant achievements.[4]

Laboratory and field tests are undertaken to determine the adaptability of tree crops to dry-land regions, and deep-rooted and drought-resistant varieties of the prune, the olive, and the apricot are being developed by selection and breeding.

Field surveys and experiments are conducted to determine the most favorable cultural factors in the production of deciduous and subtropical fruits in the several recognized, as well as prospective, fruit regions of the United States, and to secure information as to the behavior of fruit varieties grown under the peculiar climatic and other environmental conditions characteristic of such regions. This work includes studies in the propagation of fruits, nuts, and grapes and the adaptability of varieties to environment, their suitability for specific purposes, and the geography of fruit growing.

Fruit and nut improvements are effected through breeding, selection, and domestication. In this branch of the work individual trees are subject to study, and performance records are made so as to develop methods for the selection of desirable parent trees for propagating purposes and for the identification and elimination of inferior trees.

[4] Annual Report, 1926, p. 7.

The work . . . in carrying forward the bud selection, both of citrus and, at the present time, also of deciduous fruits, is, at least, from the scientific standpoint, the most striking thing that has been accomplished recently. It is introducing a fundamental change of attitude of horticulturists in the handling of fruit trees. . . . The performance record bud-selection work has established very clearly that there is a very distinct difference in the parent trees as to the quality and uniformity of the trees that are produced from them by either budding or grafting, and that bad characters, as well as good characters, may be perpetuated or accentuated in the trees that are grafted from them. . . . The records show clearly that this method of work has added both in quality and quantity to the production of the California orange, lemon, and grapefruit orchards.[5]

Within the last few years an attempt has been made to provide American sources of nursery stock, cuttings, and other propagating materials, in coöperation with state experiment stations and private nurseries.

Observations are made in the field and in the laboratory upon different crop plants growing in alkali soils to ascertain their relative adaptability. Field observations are made upon the function and structure of crop plants grown with deficient water supply to determine their comparative drought-resistance and adaptability to dry-land agriculture. Studies of native vegetation are made with reference to the character of the soil, to determine the basis for classification of new land as to its agricultural value. Crop plants that will endure alkali and drought are developed through breeding, including forage plants, pomegranates, and long staple cotton.

Studies are also made of the structure, functions, and growth of crop plants under a wide range of field conditions to determine what characteristics are of importance in adapting those plants to different environments and especially to different conditions of light, heat, atmospheric humidity, and soil-moisture supply.

In order to determine the possibilities of acclimatizing and establishing in the United States, superior varieties of crop plants that are natives of tropical countries, the Bureau conducts investigations in those countries, studying the native conditions, habits, special characters, cultural requirements, and uses, and selects the best strains for acclimatization, breeding, and testing in the United States. The subjects of investigation have included cotton, corn,

[5] House Hearings, 1925, pp. 286-87.

root crops, vegetables, palms, rubber-producing plants, and fruits, such as coffee, cacao, bananas, and avocados.

Particular attention is paid to cotton, in order to secure and to acclimatize varieties better suited to cultivation in weevil-infested regions; to determine the possibilities of extending cotton culture in arid regions where the boll-weevil is either absent or less destructive; to ascertain the nature and importance of special characters that may determine the value of varieties of cotton most suitable for particular sections and thus make it possible to avoid the mixing of seeds at the gins and to bale and class by length of staple as well as by grade; and to develop improved varieties of cotton and to insure the maintenance of adequate supplies of pure seeds of such varieties.

In the case of corn, an attempt has been made to secure varieties adapted to conditions outside of the principal corn-growing states in order to promote production under a wider range of climatic and soil conditions, particularly in the Gulf region, the arid Southwest, and the Pacific Coast states.

To determine the feasibility of increasing the production of hard fibers suitable for binding twine in Porto Rico, Hawaii, and the Philippines as well as the Canal Zone, Florida, and Texas, the Bureau collects information regarding soils, climate, and economic conditions under which sisal, henequen, and allied plants are profitably grown. Improved strains are being developed by selection and plants are being introduced.

An attempt is made to encourage the production of flax and hemp fibers for spinning. Improved varieties have been developed by breeding, and the seeds are made available to growers. The possibility of producing satisfactory fiber flax seed in this country has been demonstrated.

An incidental service to investors is also given through the dissemination of information that would tend to encourage or discourage undertakings with particular varieties in certain localities.

The Bureau collects and disseminates information about all kinds of plant fibers used for textiles, brushes, stuffing, and coarse weaving, and conducts experiments with those of promise. It has given attention to the possibilities of successful production in the United States of New Zealand flax, Manila hemp, ramie, and teazels.

The cereal improvement work includes a great variety of investigations. Varieties and races of wheat are tested in the field to determine yielding power and adaptation, and selections of promising individuals are made to serve as the basis of studies of the phenomena of inheritance. Attempts are made to improve yield and quality by breeding and selection. Milling and baking experiments have been conducted on a large number of varieties grown throughout a wide area, and the results, taken in conjunction with information on varietal distribution made available through a varietal survey, serve as the basis of recommendations as to the varieties to be grown in different sections of the country.

Similar experiments are made with oats, barley, rice, grain sorghum, broom-corn, seed-flax, rye, and buckwheat. Particular attention is given to corn.

The forage-crop work includes investigations in alfalfa designed to facilitate its culture in the Eastern states, to breed hardy varieties for the Northwest and drought-resistant varieties for the arid regions, and to promote the growth of American-grown seed. It also includes investigations of red clover seed-production, of sorghums and other dry-land forage crops, of Rhodes grass, Sudan grass, and timothy, of soy-beans and their products, and of cowpeas, velvet beans, and vetches. Studies have been made to determine the value of cacti for dry-farming. Tests are made of grasses and legumes of probable forage value.

Vegetable improvement is effected through breeding, selection, and domestic experiments. To standardize varieties as to size, season, and productiveness, seeds of the best strains of different varieties are planted, and repeated selections made for further planting until the desired uniformity is obtained. To develop better strains and varieties, cross-breeding experiments are conducted.

Field experiments are carried on with Irish potatoes to determine the influence of soil and climate on quality and productiveness and the conditions necessary for the production of varieties of special merit for particular purposes.

Studies are made of the adaptability and uses of ornamental plants and of the best methods of propagating them, also of the factors controlling the propagation of plants suitable for florists. Particular attention is paid to varieties for which American growers are dependent upon foreign sources, such as Holland bulbs and Bermuda lilies.

In coöperation with the Office of Indian Affairs the Bureau tests field and orchard crops likely to prove suitable for culture on Indian reservations.

Recent investigations have had to do with the development of the artichoke as a source of sugar.

An attempt is being made to develop new and improved strains of medicinal and essential oil plants by breeding, and to promote the production of such plants on a commercial basis in the United States. Similar efforts are being made with red pepper and ginger to determine the possibilities of establishing a domestic spice industry.

> It has been experimentally established that menthol . . . can be produced in this country. The plant from which it is derived is being commercially planted in this country with a fair prospect of making us independent.[6]

In order to develop the basis for a domestic supply of sugar-beet seed, breeding investigations are conducted to isolate the strains that produce plants superior in yield and purity of sugar. An attempt is also made to develop and improve sweet sorghum for syrup production.

Pure strains of tobacco varieties are developed by systematic selection and pure types are produced by cross-breeding, the objective being disease-resistant plants producing leaves adapted to particular purposes.

Promotion of Improved Cultural Methods. The development of superior plant varieties involves not only breeding and selection investigations but also studies to determine the proper cultural methods to be employed under different conditions of soil and climate. In most instances the two activities are carried on concurrently. The undertakings mentioned in the following paragraphs are representative, but by no means inclusive.

In connection with its pomological work the Bureau makes observations and experiments to develop the best methods of growing grapes, fruits, and nuts, including planting, cultivating, fertilizing, pruning, and spraying and to promote improved vineyard and orchard technique and nursery practice.

[6] House Hearings, 1926, p. 212.

The Bureau attempts to obtain information as to the local modifications of cultural methods necessitated by the presence of the cotton boll-weevil. Studies are made of the structure and habits of growth of different kinds of cotton under different conditions and with different methods of planting, thinning, and cultivation. Observations are made of the behavior of the plants, especially the extent to which their habits can be controlled by cultural methods.

Varieties of cotton and cultural methods are also tested in relation to drought-resistance.

In connection with the tropical plant acclimatization work, cultural improvements have been developed for the benefit of the growers of coffee, cacao, and bananas.

In the Philippines, personal direction and advice are given as to the methods of planting and cultivating plants producing fiber suitable for binder twine.

Promotion of improved cereal cultural methods is effected through observation and through experiments on field plots. An attempt is made to determine the proper dates, rates, depths, and methods of seeding for each of the important cereals. In the case of corn, a study is made to ascertain the principles that control stalk growth and grain production and the relation of the condition of the soil, cultivation, and fertilization to the development of the plant. Tillage and rotation investigations are conducted to improve yield and quality, to reduce the necessity for summer fallowing, and to improve the soil.

Cultural studies are made of a wide range of forage-crop plants, especially sorghum, the field pea, and other dry-land crops, clover, soy-beans, and cow-peas. Investigations are conducted to determine the best methods of increasing the carrying capacity of pastures, and to develop increased forage on overgrazed range lands, particularly in the national forests.

Surveys are made of truck-growing and market gardening districts to determine the cultural factors which are responsible for the loss or deterioration of vegetable crops. Rotation experiments are conducted to determine the best methods of maintaining the productive capacity of the soil. Field tests are made and seed growers' methods are studied to determine the most economical and successful methods of growing vegetable and flower seeds.

Field studies are made of greenhouse problems, including methods of construction and management and the relation of all factors to the successful growth of ornamental and florists' plants, vegetables, and fruits under glass.

Details of the cultural requirements for the growing of camphor, red pepper, and ginger have been worked out to promote domestic production on a commercial basis. Hop growing methods are studied to determine the possibility of modifying chemical constituents by cultural treatment. Cultural tests of plants yielding tannins and dyes are made to determine the possibility of commercial production.

Experimental plantings and field tests are made of oil-seed plants to secure data on the best cultural methods, including rotation of crops and the use of fertilizers.

Special attention is given to weeds and weed problems throughout the country with a view to determining the best methods of controlling the most pernicious varieties through systems of tillage and rotation.

Studies are made of local cultural methods in connection with sugar-beets with a view to the development of the best system of crop rotation. Advice is given as to methods of growth of sugar-beet seeds.

In connection with the various investigations of tobacco, attention is given to devising improved cultural methods, including rotation systems.

An important project of the Bureau has to do with dry-land agriculture in the Great Plains region. the purpose being to determine the best methods of soil cultivation and crop rotation for the conservation of moisture and the maintenance of moisture in the soil. This is accomplished through field stations where samples of soil are taken and moisture determinations and meteorological observations are made, and records are kept of the preparation, seeding, tillage, harvesting, weighing, and measuring of all crops grown on dry-land plots.

Investigations of cultural methods are made, particular attention being given to soil-treatment through drainage and washing out of accumulated alkali.

An allied project relates to agriculture on irrigated and other lands in the arid and semiarid regions of the West. Here the object

is to determine the crop varieties and agricultural methods best suited to successful farming on the several reclamation projects. Experiments are conducted in irrigated crop rotations, notes are taken on the behavior of different crops under various treatments, moisture determinations are made, cultural and harvesting operations are supervised, and records are kept of operations, crop yields, etc. Varietal tests are made of silage crops, alfalfa, truck crops, deciduous fruits, and cotton at the various field stations through which the work is conducted.

The Bureau is concerned with the improvement of methods of treating land and crops so as to diminish the losses due to attacks of free-living and plant-infesting nematodes or threadworms, which infest sugar-beets, clover, bulbs, and other plants. This project includes a technological study of the nematodes themselves and the development of cultural methods that will facilitate control of the pests.

Promotion of Improved Methods of Handling of Crops. An important part of the work of the Bureau of Plant Industry is concerned with the development of better methods of handling crops from the field to the market.

Particular attention has been given to fruits, the effect on their physical condition and keeping qualities of various methods of handling at picking time and in packing, transporting, storing, and marketing; methods of sizing, wrapping, packing, and character of containers; and methods of stowing in cars and in storage. Various lots of fruits of the same variety having like developmental history are picked in various receptacles, sized on different types of sizers, wrapped in different types of material, stored in different types of containers, stowed in different ways, and held at various temperatures, in order to determine the effects of these various processes in the commercial handling of fruits from the field to the market. The degree of maturity of fruits when picked is also subjected to investigation to determine the effect on storage life.

In the case of Muscadine grapes, investigations are made to determine the best methods of harvesting and handling; in the case of nuts, methods of sizing and grading have been worked out and adopted as standards by the industry.

Binder twine fiber production in the Philippines is encouraged through instructions in methods of preparing the fiber. American grown hemp production is encouraged through dissemination of information as to the best methods of handling the crop.

Broom-corn experiments are conducted to determine the effects of harvesting the brush at different stages of development and of curing it by different methods, with special reference to color, weight, and durability of brush. Popcorn is studied to determine methods of curing and storage that will improve quality and wholesomeness. Methods of seed-corn selection, fumigation, drying, and preservation are tested in different environments.

Investigations are conducted with cow-peas to determine the best methods of harvesting and thrashing the seed, and with soybeans to determine the best harvesting methods.

Experiments are made to determine the effects upon the keeping qualities of vegetables of various methods of handling during harvesting, packing, transporting, storing, and marketing; of different harvesting devices and receptacles; of sizing, and of stowing in cars and in storage. Various lots of vegetables of the same variety having like developmental history are harvested, packed in receptacles of different sizes and types, stowed in cars and in warehouses in different ways, and held at different temperatures, and the results of these processes upon the commercial value noted. Studies are also made to determine the critical holding temperatures of vegetables produced under different conditions and of the effect of maturity upon storage life.

Other related projects are concerned with methods of handling standard vegetables to overcome losses in the field and in storage; methods of harvesting and thrashing peanuts; method of treating, handling, storing, and cutting seed-potatoes; and method of curing and storing bulbs.

In coöperation with the Office of Indian Affairs the Bureau attempts to train Indians on reservations in methods of handling crops.

A group of projects has to do with crop-handling, including methods of harvesting and thrashing of oil-seed plants and essential-oil plants, drug plants, hops, red pepper, and ginger. In the case of drug plants yielding fixed and volatile oils, studies are

made of the effect on quality and yield, of the time of collection or harvesting and the methods of preparation.

Beet growers, sugar companies, and seedsmen are advised and assisted in methods of commercial beet-seed production, including the selection and storing of the roots and the harvesting and cleaning of the mature seed.

The tobacco investigations include attempts to devise improved methods of handling varieties intended for particular uses, including cigar wrapper, filler, and binder, and methods of curing the crop by the sun, fire, and flue processes.

Studies are also made of the physiology, pathology, and chemistry of the tobacco plant in their relation to methods of growing, curing, fermenting, and handling.

Promotion of Utilization of Plants and Plant Products. Between the grower and the user or manufacturer of plants or plant products there is need for better coördination, and the Bureau of Plant Industry endeavors to bring this about. This is done by promoting an understanding of the conditions and limitations of production and of the reasonable requirements of utilization, by developing improved methods, processes, and apparatus, and by determining the economic value of plants and plant products now wasted or not produced on a commercial basis.

In the case of dates, an attempt has been made to work out methods of packing which will permit of the wider utilization of inferior dates; and in the case of figs of the Smyrna type an attempt has been made to determine the precautions necessary in packing fresh figs. Investigations are conducted to determine the uses of different varieties of grapes, both for dessert purposes and for the manufacture of unfermented juice, and attempts are made to discover new uses for nut material now largely wasted.

Information is sought relative to the best and most practical methods of using fruits especially produced for desiccation, canning, or preserving, and those which cannot be profitably disposed of in a fresh state. Construction and operating costs have been worked out for various types of evaporators, as well as standardized plans of evaporating installations.

Machines have been introduced in the Philippines, Porto Rico, and Hawaii for cleaning binder-twine fibre, and the superiority of machine methods over hand methods effectually demonstrated.

Technological studies are made of cotton fibres, their length and form, their tensile strength, and their ability to absorb atmospheric moisture.

One of the features of the forage-crop investigations is an attempt to bring about an increased use of soy-beans, not only for forage but also for the production of oil and meal and for human food. Similarly, efforts are made to extend the use of the peanut both for the manufacture of oil and for human food as well as for forage in connection with pork production in the Southern states.

Utilization investigations are conducted to develop methods of conserving vegetables, whether for home consumption or the market. They are concerned with such matters as preparing, drying, curing, packing, and storing all of the more important varieties of vegetables, the cost of operation of various types of evaporators, and the preparation of flour from potatoes.

A series of projects relates to vegetable oils and the extension of their use by manufactures. In the case of essential oils, methods of distillation and types of machinery and apparatus have received attention. Wastes resulting from canning and packing of plant products are submitted to laboratory examination, to determine their commercial value as sources of fixed and volatile oils or other constituents. In connection with the studies of poisonous plants, investigations have been made to determine their value as sources of insecticides.

Efforts are being made to promote the farm production of table syrup from sugar-cane and from sweet sorghum and to develop uses for by-products for fertilizer, paper-making, or stock feed.

Continuous study is made of farm apparatus in order to improve its efficiency and to devise new types as the need arises. Many machines and pieces of apparatus have been developed and put into use, notably: a camphor-harvesting machine, syrup-making apparatus, a clover seed harvester, a bulb-trimming machine, and a number of devices to facilitate the handling of cotton.

Investigations in Systematic Botany. One of the duties of the Bureau of Plant Industry is to furnish the various branches of the Department of Agriculture the correct names of plants, the identity of which is a matter of importance in their work.

A bibliographical service is maintained to facilitate the work of botanical investigations by putting them in touch with the literature of their subject in the various libraries in Washington.

The literature on exploration, early travels, and settlement in this country is examined and references to plant subjects abstracted, particularly plants used by the aborigines. An attempt is also made to collect and to make available for public use, information on the native plants of Mexico, with special reference to the utilization of valuable species in the United States.

The Bureau has in preparation a descriptive manual classifying the North American grasses, based upon work in the field and the laboratory and research in agricultural literature. It maintains a grass introduction index, compiled from a wide range of sources; also a grass herbarium, which includes specimens of wild and cultivated grasses of the world.

There is also a general working herbarium of over 50,000 specimens of cultivated plants which is used for purposes of reference and study. Studies are made in this collection and in the field to develop classifications of forage plants, ornamental trees and shrubs, fruit trees and shrubs, cereal plants, and vegetables, to accumulate data on the origin and history of specific varieties, and to promote accurate varietal nomenclature. Information is also collected as to the geographical distribution and localization of poisonous plants, and as to their identity and harmful characteristics.

General Physiological and Fermentation Investigations. The work in general plant physiology is aimed at fundamental conditions out of which it is hoped to develop information which will disclose obscure but important things in connection with the laws governing the growth of plants and connected with their susceptibility to disease. It includes studies of the physiological action of solutions of organic and of inorganic substances on crop plants to ascertain the fundamental requirements of plants upon the medium in which they live; of the injury to plants by low temperatures; of the effects of storage on fruits and vegetables; of molds and their relation to the deterioration of plant products; of plant parasites in relation to the plant attacked; of the germination of reproductive plant structures; of the causes of immunity to disease; and of the causes of those plant diseases which are physiological in

their nature. These investigations are carried out in coöperation with a wide range of related projects conducted by the various specialized subdivisions or " offices " of the Bureau.

Ecological Investigations. In connection with the investigations of alkali and drought-resistant plants, an attempt is made to apply physiological and ecological methods to the problem of plant production and by comparative study of the physiological processes and the individual response of plants to a wide range of climatic conditions, to determine the individual peculiarities of plants as a means of explaining their success or failure under cultivation in any particular environment.

Biophysical Investigations. Like the work in plant physiology, the biophysical investigations supplement the studies conducted under other projects. They have to do generally with the effect of various methods of soil preparation and crop rotation upon the moisture content, temperature, humus content, soluble-salt content, aeration, and other weather conditions in relation to crop production.

Investigations in Plant Diseases. One of the fundamental lines of work undertaken by the Bureau of Plant Industry is investigation of the causes, treatment, and prevention of diseases of plants.

The purpose of the general survey of plant diseases is to collect and record information as to the geographical distribution, annual prevalence, and rate of spread of diseases of economic plants and the losses occasioned thereby; to discover new and possibly dangerous diseases promptly in order that restrictive measures may be devised; to study epidemics and the conditions governing the development, spread, and control of diseases; and to collect information on the resistance and susceptibility of varieties to diseases and the practical effectiveness of various control methods. The objective is promptness in the collection and dissemination of information among the plant pathologists of state experiment stations throughout the country as to the presence of any new disease or of any known disease that promises to become epidemic.

In connection with the plant disease survey a laboratory is maintained for the deposit, maintenance, and distribution of pure cul-

tures of pathogenic organisms for the use of persons engaged in pathological work.

The Bureau maintains a pathological herbarium containing specimens of fungi arranged with a view to assisting mycological and pathological investigators; also a mycological index and a host index, designed to furnish information as to new genera or species of fungi and as to the geographical distribution of diseases, their intensity and measures of control or eradication. It has developed a mycological exchange, which receives specimens for the pathological herbarium and distributes specimens to investigators and institutions interested in the economic study of fungi. In this connection it maintains an identification service.

In the laboratory of plant pathology are conducted various general investigations of the life history of parasitic fungi and bacteria with a view to discovering preventive means and remedies; also miscellaneous special investigations of a varied character.

A wide range of projects is concerned with fruit diseases, including the diseases of general orchard fruits and nuts, grapes and small fruits, citrus and subtropical fruits, and diseases which are physiological in their nature; diseases of the parent plant itself, its roots, trunk, bark, and foliage, and of the fruit as a living organism. Attention is given to spraying apparatus and methods and fungicides, and to the development of methods of handling fruit from the tree to the market so as to prevent losses from diseases and rots. In the Gulf States a successful campaign has been conducted against the citrus canker in coöperation with state authorities having power to destroy infected trees.

The cotton-disease work consists of general observations and field surveys to determine the prevalence and distribution of diseases, general pathological investigations, breeding of wilt-resistant varieties, and encouraging production of disease-resistant seed in commercial quantities.

Cereal disease investigations have to do with a variety of rusts, smuts, and other fungus and non-parasitic diseases of cereals, and also with bacterial diseases of corn and the black chaff of wheat. A prominent feature of the work in connection with rusts has been the arousing of sentiment in grain-growing states in favor of eradication of the common barberry, from which rust spores origi-

nate. This is a coöperative project, the actual work of barberry destruction being performed by state officers and under state authority.

The diseases of forage crops, especially alfalfa, clover, and cowpeas, are studied in the laboratory and in field plots, and surveys are made to determine the prevalence and distribution of diseases. Disease-resistant cowpea breeding is conducted and the production of resistant seed encouraged. Attention is also given to disease-resistant conditions governing the growing of other legumes, and to the control of diseases caused by parasitic nematodes.

Truck-crop diseases are considered under a series of projects dealing with potatoes, sweet potatoes, asparagus, cucumbers, tomatoes, watermelons, beans, and other vegetables of economic importance. The procedure varies, but the purpose of all these investigations is to discover causes and methods of prevention or control. Laboratory and greenhouse studies are made of truck-crop diseases caused by nematodes and methods worked out for their control.

In the case of tobacco, an attempt is being made to determine the means of preventing and eradicating the bacterial wilt disease through improved methods of cultivation and soil management, and to produce types resistant to root-rot and other field diseases.

Diseases of ornamental trees and shrubs are considered as to cause, distribution, extent, and frequency of occurrence with particular reference to their danger as possible epidemics. An attempt is made to determine varietal and specific resistance to disease and to improve and standardize methods of tree-surgery. Forest-tree diseases are studied with reference to their control, particularly in the national forests. Studies are also made of the nature and life history of various tree diseases, with reference to control, and of the effect of smelter fumes, smoke, and gases upon trees. Problems of timber conservation are considered in a variety of aspects, including the use of preservatives.

Increasing attention is given to imported and epidemic tree diseases, including the chestnut bark disease, the European poplar canker, the pitch-pine blister rust, and the white-pine blister rust. Since 1918 a special effort has been made to eradicate or control the white-pine blister rust through coöperative arrangements with state and other authorities and with organizations or individuals.

Appended is a statement of the results of a quarter-century's campaign against plant diseases, taken from the current report of the Bureau:[7]

While there is no question that very great benefit in the production of many crops resulted from methods of disease control established by the Bureau, it is difficult in most cases to estimate this benefit in dollars and cents. Some items which can be estimated with a reasonable degree of accuracy are as follows:

For the prevention of bunt disease of wheat the copper-carbonate treatment was applied to the seed sown on at least 3,300,000 acres in 1925. More recent data are not available, but in view of the fact that a large acreage in Minnesota, the Dakotas, and Montana was sown with copper-carbonate-treated seed in the spring of 1926, it seems safe to estimate that one-tenth of the total 57,000,000 acres of wheat grown in the United States during the current year was sown with seed treated with copper-carbonate. On the basis of reduced bunt infection, improved germination in comparison with ordinarily disinfected seed, better stands, saving in seed requirements, etc., the net gain of this seed treatment, developed in the coöperative work of the department and the State experiment stations, is at least 5,000,000 bushels, and in all probability this may be effected annually.

The discovery that heat canker of flax can be largely controlled by earlier seeding has resulted in a much wider application of this practice. On the average, better yields are obtained from early seeding, so the value resulting from this discovery is much greater than the direct one resulting from the control of the canker itself. It is probably quite conservative to estimate a gain of at least 500,000 bushels annually from earlier seeding.

The average annual benefit from the control of black rot and mildew of the grape and other diseases of grapes, small fruits, and cranberries through methods of spraying discovered or improvements devised by the department, while impossible of exact determination, is known to be very great.

In the prevention of peach-leaf curl and California peach blight through methods of spraying discovered by the department an annual saving of about 2,000,000 bushels of peaches has been brought about.

The development of self-boiled lime-sulphur spray gave growers control of brown rot and scab of peaches, and to growers of stone fruits this has saved 12,000,000 bushels annually.

The development of successful spraying and sanitation for apple bitter rot, blotch, scab, and scald, and the development of the oiled wraps for apples have approximated annual gains or savings of 20,000,000 bushels of merchantable fruit.

[7] Annual Report, 1926, pp. 1-3.

The method developed for combating citrus scab, melanose, stem-end rot, blue-mold rot, dieback, chlorosis, and foot rot have resulted in an annual saving of about 500,000 boxes of citrus fruit.

Previous to the 1909 orange crop the losses sustained by the California orange growers from the rotting of oranges in transit ranged from 8 to 20 per cent of the total shipment, averaging around 12 per cent. The investigational work of the Bureau which showed the necessity of careful handling of oranges clearly demonstrated that it was feasible to reduce the losses from rot in transit from the averages then prevailing to around 2 per cent. In addition to the actual increase in quantity of sound oranges delivered in the markets, the unit value of the crop has been decidedly increased by the improved methods of handling, including more efficient refrigeration equipment and practice. The general appearance and condition of the fruit are so superior at the time of delivery at the market that its selling value is very much greater than was possible when so large a percentage of deterioration took place during the transit period.

Three extensive direct-service campaigns to put into effect results of research work in the control of important plant diseases have been developed in coöperation with the States concerned, as follows:

The campaign for the eradication of citrus canker, a bacterial disease of citrus fruits and trees, was undertaken in 1915, in coöperation with the Gulf States, namely, Florida, Alabama, Louisiana, Mississippi, and Texas. The disease has now been practically eliminated from the greater portion of the commercial citrus-growing region, and, with the exception of scattered infections of nursery stock in Louisiana, no new infections have been reported recently. There is no question that the large citrus industry in Florida has been saved by this intensive campaign.

The coöperative program for the control of white-pine blister rust, a parasitic fungus affecting alternately white pines and currant and gooseberry bushes, was undertaken in 1917, when from the preliminary work it had become apparent that the rust was so widespread that it could not be eliminated from the country. By 1921 it had been conclusively demonstrated that local control of the rust could be practically and effectively accomplished under eastern forest conditions by the eradication of all currants and gooseberries within 900 feet of white-pine stands, and in 1922 an 8-year coöperative control program, including eradication of currants and gooseberries from the pine stands and their immediate vicinities, was undertaken with New York and the New England States. In 1921 the rust was found in western Washington and in British Columbia, and, since the Idaho white-pine belt and other pine regions were threatened with the spread of the disease, a coöp-

erative 10-year program was inaugurated in 1924 with California, Oregon, Washington, Idaho, and Montana to delay the spread of the disease and to develop control measures.

The campaign to eradicate the common barberry, for the purpose of reducing stem-rust losses of small grains, was undertaken in 1917 with Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. It is evident that barberry eradication is a material aid in the solution of the stem-rust problem. A single infected barberry bush has been known to cause a local loss to wheat growers, in one township in one year, of more than 10,000 bushels of grain. In the eastern winter-wheat producing States of the eradication area stem rust of wheat is controlled as soon as the barberries are eradicated from a locality. If the more than 12,000,000 harmful barberry bushes, seedlings, and sprouting bushes already destroyed had been allowed to continue to grow in grain-producing areas of the United States there is no question that the grain crop would have been many times more severely jeopardized every year than with these centers of infection eradicated.

CHAPTER III

ORGANIZATION

The regular personnel of the Bureau of Plant Industry numbers about 1200, all positions being under the classified civil service.

General Administration. At the head is a Chief, who is responsible to the Secretary of Agriculture, and an Associate Chief. These two officers exercise the same general administrative functions, dividing the work between them, and share in the direction of the investigational activities.

An Assistant to the Chief is in charge of business operations. There is a Property Room and an Office of Records, each in the charge of a Senior Administrative Assistant, and a Photographic Laboratory under an Associate Physiologist.

An Assistant in Charge of Publications is responsible for the editing and preparation for the printer of manuscripts prepared by investigators, and generally for all printing required by the Bureau.

The library service is largely departmental in character, but the Bureau of Plant Industry has some of its personnel assigned to work in the central library. A small library staff within the Bureau is engaged in research and reference work.

Scientific Offices. Unlike most of the other bureaus in the executive departments the Bureau of Plant Industry is not organized into divisions and sections. Instead, it has groups of projects, and an assembling of these groups into the lines of activity as laid down in the acts of appropriation. Responsible for each line of work is an Office, of which there are twenty-seven. The allocation of activities among these organization units is presented below.

Office of Tobacco and Plant Nutrition. This Office conducts the plant nutrition investigations of the Bureau, dealing with the growth, development, and composition of plants as affected by length of day, the effect of different systems of crop rotation, plant-food elements, and the relative plant-food requirements of crops commonly grow in rotation. On account of the significant

results of this work in connection with tobacco, it has been joined administratively with the regular tobacco investigations, which include the breeding and selection of improved varieties, cultural methods, crop handling, and combating of diseases. A Physiologist is in charge.

Office of Seed Laboratory. The seed testing laboratories examine and report upon samples of forage-crop seeds tendered for importation into this country and samples of domestic seeds bought in the open market. It also conducts a general educational service in the interest of pure seed for the farmer. A Botanist is in charge of the Office and Laboratory in Washington. In the field there are four coöperative laboratories.

Office of Foreign Plant Introduction. The Office of Foreign Plant Introduction obtains new and promising seeds and plants through exploration and correspondence and tests them at field stations or through coöperation with other agencies, public and private. It is also interested in plant propagation and in the development of certain plant industries. An Agricultural Explorer is in charge. Attached to the Office are plant introduction gardens in different parts of the country.

Office of Crop Physiology and Breeding. A Physiologist is in charge of the Office of Crop Physiology and Breeding, which investigates the physiology of crop plants with a view to determining the limiting factors which control their successful culture and conducts the breeding and testing of new varieties. Particular attention is given to dates, figs, citrus fruits, pistaches, and certain drought-resistant tree crops. Several field stations are maintained and investigations are conducted on some Southwestern Indian reservations to determine the crop plants best suited for culture by the Indians.

Office of Horticulture. The work of the Office of Horticulture has to do with the improvement of methods of breeding, culture, utilization, storage, and transportation of fruits, truck, and related crops; vegetable and landscape gardening; and floriculture and related subjects. It is directed by a Horticulturist, who has a number of field stations under his jurisdiction.

Office of Alkali and Drought-Resistant Crops. This Office investigates the alkali resistance of crop plants; develops by breeding

and selection strains of field crops more resistant to drought; and studies the physiology of drought resistance. Special attention is given to the development of long staple cotton in the Southwest. In charge of the work is a Physiologist.

Office of Cotton, Rubber, and Other Tropical Plants. The work of this Office is directed chiefly to the acclimatization in the South and Southwest of varieties of cotton, corn, and other crop plants of tropical origin, including the breeding of superior varieties of cotton and the development of cultural methods to meet boll-weevil conditions. It also conducts the rubber-producing investigations recently authorized by Congress. It is directed by a Botanist.

Office of Fiber-Plants. The Office of Fiber-Plants is concerned with the fiber-producing plants which are likely to prove of value and with the encouragement of fiber-plant industries in the United States. At the head of the work is a Botanist.

Office of Cereal Crops and Diseases. The Office of Cereal Crops and Diseases deals with the genetics, culture, adaptation, and uses of cereal crops, the prevention of cereal diseases, the cultivation of seed-flax, and the production and improvement of broom corn. An Agronomist is in charge. There is a large number of field stations.

Office of Forage Crops. The forage-crop investigations include methods of production, development, and dissemination of seeds of new and rare varieties of value; extension of forage crops, including plants used for green manuring and soil binding, into regions to which they are adapted; and coöperation in the introduction and extension of new crops. An Agrostologist is in charge of the Office.

Office of Drug, Poisonous, and Oil Plants. The investigations conducted by this Office include the commercial culture and production of drug, oil-seed, volatile-oil, and related crops; the utilization of waste materials of the canning and fruit-packing industries as sources of oils and other valuable products; the improvement of the active-principle content of drug plants; and the properties and geographic distribution of poisonous plants. The Office is in charge of a Physiologist.

Office of Plant Geography and Physiology. This Office is concerned with the investigation of the physiological processes in plants, including the carbohydrate metabolism of vegetables during growth and in storage; the nitrogen metabolism and protein syn-

thesis of plants; the pigment and surface coverings of plants; natural vegetation as an indicator of environmental conditions of soil and climate; the effect of low temperature on plants; the cell sap of plants and the relation of changes therein to certain plant diseases and to physiological behavior; and the absorption of salts by plants. A Physiologist is in charge.

Office of Sugar Plants. The Office of Sugar Plants is concerned with all factors affecting the production and improvement of sugar plants. This includes the study of diseases as well as breeding, selection, and importation of varieties, cultural methods, the handling and utilization of the raw material and by-products, and the relation of sugar crops to other farm activities. A Pathologist is in charge of the work.

Office of Dry-Land Agriculture. This Office aims to determine the possibilities and limitations of agriculture in the semi-arid regions of the West, the cultural methods necessary for profitable production, and the fundamental principles of dry-farming. An Agriculturist is in charge.

Office of Western Irrigation Agriculture. In coöperation with the Bureau of Reclamation this Office is engaged in the development of agriculture on irrigated lands in the West and in testing various crops that may be grown under irrigation. The work is directed by an Agriculturist.

Office of Botany. This Office maintains collections of cultivated plants and makes systematic studies of grasses and other plants of economic importance. It compiles for publication information on native plants, identifies and tests wild and little known plants, devises methods for the control and eradication of weeds, and conducts experiments with a view to improving the grazing areas on the public lands. A Botanist is responsible for this work.

Office of Nematology. The work of this Office is divided between investigations of the nematodes, or threadworms, which infest the roots of important crops, such as the sugar beet, and technological investigations dealing with the improvement of methods of crop production. A Nematologist is in charge.

Biophysical Laboratory. This Office studies physical problems connected with the work of the Bureau, especially those in relation to dry-land agriculture, including the water requirements and

nutrition of crop plants and the influence of the physical environment—heat, light, moisture, etc., on the growth of crops and the development of special varietal characters. The work is under a Botanist.

Pathological Laboratory. This is the central working laboratory for all of the pathological investigations conducted by the Bureau. A Pathologist is in charge.

Office of Mycology and Disease Survey. This Office maintains a large collection of specimens of all plant parasites and other fungi, systematically arranged, records the geographical distribution, annual prevalence, and rate of spread of diseases of economic plants, and estimates the amount of loss resulting therefrom. It studies epidemics in relation to environment, and gathers and publishes information on the appearance of new or dangerous diseases, resistance and susceptibility of varieties to disease, and the effectiveness of measures of control. It is under a Mycologist.

Office of Fruit Diseases. The Office of Fruit Diseases is concerned with the diseases of nuts, fruits, and fruit and nut trees and methods of control or prevention. It studies the decay and spoilage of fruits in transit, storage, and on the market, and, in coöperation with the Bureau of Agricultural Economics, it makes pathological inspections of fruit during marketing. In charge is a Pathologist.

Office of Citrus Canker Eradication. Under the Associate Chief of the Bureau coöperative work is being done in the South to eradicate citrus canker through inspection, soil treatment, spraying, and the destruction of diseased trees.

Office of Vegetable and Forage Diseases. This Office is concerned with the diseases of garden vegetables, forage plants, and ornamental plants, including methods of prevention and control, and diseases of cotton and of forage and related plants. In coöperation with the Bureau of Agricultural Economics it studies the problem of deterioration of vegetables in storage and in transportation. It is in charge of a Pathologist.

Office of Forest Pathology. The investigations in forest pathology cover diseases affecting forest and shade trees, shrubs, and timber. They are conducted in coöperation with the Forest Service under the direction of a Pathologist.

Office of Blister-Rust Control. The Office conducts a coöperative campaign against the white-pine blister-rust, with the aim of

controlling it in the Eastern States and preventing or retarding its spread into the West. A Pathologist directs the work, and the coöperators are state officers in infected areas.

Office of Gardens and Grounds. The scientific work of this Office has to do with the inspection and fumigation of plants, seed testing and propagation of ornamental plants, and experiments with florists' crops. It is also charged with the maintenance of the greenhouses and plant collections in Washington and also of the grounds of the Department of Agriculture. An Assistant is in charge.

Arlington Experimental Farm. The farm at Arlington is the main field laboratory for the Bureau of Plant Industry and also for other bureaus of the Department of Agriculture. Its operations are directed by a Superintendent.

APPENDIX 1

OUTLINE OF ORGANIZATION

Explanatory Note

The purpose of Outlines of Organization in this series of Monographs is to show in detail the organization and personnel of the several services of the national government to which they relate. They have been prepared in accordance with the plan followed by the President's Commission on Economy and Efficiency in its outlines of the organization of the United States government.[1] They differ from those outlines, however, in that whereas the Commission's report showed only organization units, the presentation herein has been carried far enough to show the personnel embraced in each organization unit.

These outlines are of value not merely as an effective means of making known the organization of the several services. If kept revised to date, they constitute exceedingly important tools of administration. They permit the directing personnel to see at a glance the organization and personnel at their disposal. They establish definitely the line of administrative authority and enable each employee to know his place in the system. They furnish the essential basis of plans for determining costs by organization division and sub-division. They afford the data for a consideration of the problem of classifying and standardizing personnel and compensation. Collectively they make it possible to determine the number and location of organization units of any particular kind, such as laboratories, libraries, blue-print rooms, or other plants, to what services attached and where located, or to determine what services are maintaining stations at any city or point in the United States. The Institute hopes that upon the completion of the present series, it will be able to prepare a complete classified statement of the technical and other facilities at the

[1] 62 Cong., H. doc. 458, 1912, 2 vols.

disposal of the government. The present monographs will then furnish the details regarding the organization, equipment, and work of the institution so listed and classified.

OUTLINE OF ORGANIZATION

BUREAU OF PLANT INDUSTRY
DEPARTMENT OF AGRICULTURE
JUNE 30, 1926

Units of Organization; Classes of Employees	*Number*	*Annual Salary Rate*[1]
1. General Administration		
1. Office of Chief		
Chief	1	$6,500
Administrative Assistant	1	2,600
Clerk-stenographer	1	2,200
Messenger Boy	1	720
2. Office of Associate Chief		
Associate Chief	1	6,000
Administrative Assistant	1	2,700
Principal Clerk-stenographer	1	2,400
Principal Clerk	1	2,100
Clerk-stenographer	1	1,860
3. Office of Assistant to the Chief		
Assistant to the Chief	1	4,400
Administrative Assistant	1	2,700
	1	2,600
Senior Clerk	3	2,200
	1	2,040
Assistant Clerk-stenographer	1	1,680
	1	1,560
	4	1,500
Junior Clerk	1	1,500
Senior Laborer	1	1,140
Senior Laborer in Charge of Char Force	1	1,080
Office Laborer	20	376
Minor Scientific Helper	2	900
Senior Clerk in Charge of File Room	1	1,860
Assistant Clerk	2	1,680
Assistant Messenger	1	900
Clerk in Charge of Bureau Mail Room	1	1,740
Messenger	5	1,080
	1	1,020

4.	Property Room		
	Senior Administrative Assistant in Charge	1	3,200
	Senior Clerk	1	2,000
	Clerk	1	1,740
	Assistant Clerk	2	1,680
		1	1,560
	Junior Clerk-stenographer	3	1,500
		1	1,380
	Under Clerk-typist	1	1,140
	Senior Laborer	1	1,260
		1	1,140
5.	Office of Records		
	Senior Administrative Assistant in Charge	1	3,100
	Junior Administrative Assistant	1	2,500
	Principal Clerk	1	2,300
		1	2,200
	Clerk	1	1,920
		2	1,860
		3	1,740
		1	1,680
	Assistant Clerk	3	1,560
		2	1,500
6.	Photographic Laboratory and Exhibits		
	Associate Physiologist in Charge	1	3,400
	Senior Photographer	1	2,300
	Under Photographer	1	1,320
7.	Office of the Editor		
	Associate Editor	1	3,100
	Principal Clerk	1	2,100
	Senior Clerk	1	2,100
	Clerk	1	1,680
	Assistant Clerk-stenographer	1	1,500
	Junior Clerk	1	1,320
	Under Clerk-typist	1	1,200
8.	Library		
	Assistant Librarian	1	2,400
	Junior Librarian	1	1,920
		1	1,860
	Library Assistant	1	1,740
	Under Library Assistant	1	1,380
	Minor Scientific Helper	1	900
	Clerk-stenographer	1	1,740
	Under Clerk-typist	1	1,320
	Assistant Messenger	1	900

2. Scientific Offices
   1. Office of Tobacco and Plant Nutrition
      1. Headquarters, Washington, D. C.

Senior Physiologist in Charge	1	5,400
Physiologist	1	3,800
Associate Physiologist	1	3,200
Assistant Agronomist	1	2,900
Assistant Physiologist	2	2,500
Assistant Biochemist	1	2,400
Under Scientific Helper	1	1,200
Junior Laborer	1	900
Senior Clerk	1	1,920
Assistant Clerk-stenographer	1	1,500

      2. Tobacco Station of Agricultural Experiment Station, Windsor, Connecticut

Agent	1	2,000

      3. Georgia Coastal Plain Experiment Station, Tifton, Georgia

Agent	2	2,400
Unskilled Laborer	1	845
	1	115

      4. Branch Station, Agricultural Experiment Station, Upper Marlboro, Md.

Principal Scientific Aid	1	2,400

      5. U. S. Tobacco Field Experiments, Baldwinsville, New York

Principal Scientific Aid	1	2,400

      6. Tobacco Station of Agricultural Experiment Station, Oxford. N. C.

Agronomist	1	3,800
Unskilled Laborer	1	830

      7. State Branch Station, Ephrata, Pa.

Associate Agronomist	1	3,000

      8. U. S. Tobacco Field Experiments, Timmonsville, South Carolina

Scientific Aid	1	1,800

      9. Tobacco Station, Agricultural Experiment Station, Clarksville, Tennessee

Unskilled Laborer	1	1,520

      10. State Branch Station, Bowling Green, Virginia

Agent	1	1,200
Unskilled Laborer	1	845

      11. U. S. Arlington Experiment Farm, Rosslyn, Virginia

Scientific Aid	1	1,800

12. Branch Station of Agricultural Experiment Station, Maggie, West Virgina		
Agent	1	900
13. Agricultural Experiment Station, Madison, Wisconsin		
Agent	1	1,600
	1	600
2. Office of Seed Laboratory		
1. Headquarters, Washington, D. C.		
Senior Botanist in Charge	1	5,200
Associate Physiologist	1	3,100
Associate Botanist	1	3,000
Assistant Botanist	1	3,000
	1	2,900
Junior Physiologist	1	1,920
Junior Botanist	1	2,200
	1	2,100
	1	1,920
	3	1,860
Under Scientific Helper	1	1,500
Junior Laborer	1	900
Principal Clerk	1	2,100
Clerk	1	1,860
Assistant Clerk	1	1,560
Junior Clerk	1	1,440
Junior Messenger	1	720
2. Field Service		
Collaborators (Not to exceed $40 per annum)	64	
Collaborators (Without compensation)	4	
3. Coöperative Seed-Testing Laboratory, Sacramento, California		
Assistant Botanist	1	2,500
4. Coöperative Seed-Testing Laboratory, Lafayette, Indiana		
Assistant Botanist	1	2,400
5. Coöperative Seed-Testing Laboratory, Columbia, Missouri		
Junior Botanist	1	1,860
6. Coöperative Seed-Testing Laboratory, Corvallis, Oregon		
Assistant Botanist	1	2,400
3. Office of Foreign Plant Introduction		
1. Headquarters, Washington, D. C.		
Senior Agricultural Explorer in Charge	1	5,200
Senior Pathologist	1	5,200
Botanist	1	3,800

	Horticulturist	1	4,000
	Agricultural Explorer	1	3,800
	Associate Horticulturist	1	3,200
	Associate Botanist	1	3,000
	Assistant Botanist	1	2,400
	Senior Scientific Aid	1	2,300
	Scientific Aid	1	1,800
	Head Gardener	1	1,500
	Under Scientific Helper	1	1,260
	Principal Clerk	1	2,500
	Clerk	2	1,800
		3	1,680
	Assistant Clerk	1	1,680
		2	1,500
	Junior Clerk	1	1,440
		1	1,380
		2	1,320
	Senior Laborer	2	1,020
	Junior Messenger	1	600
	Head Gardener	1	1,860
2.	U. S. Plant Introduction Garden, Chico, California		
	Superintendent	1	2,900
	Senior Scientific Aid	1	2,200
	Junior Scientific Aid	1	1,500
	Senior Clerk	1	2,200
	Senior Plant Propagator	2	1,860
	Unskilled Laborer	1	1,565
		1	1,380
		1	1,330
		1	1,260
		1	1,170
3.	Canton, China		
	Agricultural Explorer	1	1,500
4.	U. S. Plant Introduction Garden, Chapman Field, Coconut Grove, Florida		
	Associate Horticulturist and Superintendent	1	3,000
	Principal Scientific Aid	1	2,400
	Assistant Scientific Aid	2	1,560
	Mess Cook and Caretaker	1	480
	Unskilled Laborer	2	1,620
		1	1,440
	Farm Laborer	1	1,560
		1	1,500
		1	1,440
		1	1,400

5. Gainesville, Florida		
Associate Horticulturist	1	3,000
6. Little River, Florida		
Collaborator	1	300
7. U. S. Plant Introduction Garden, Miami, Florida		
Superintendent	1	2,500
8. U. S. Plant Introduction Garden, Savannah, Georgia		
Superintendent	1	2,800
Unskilled Laborer	1	1,020
	1	780
9. U. S. Plant Introduction Garden, Bell, Maryland		
Superintendent	1	2,800
Head Gardener	1	1,560
Gardener	1	1,620
	1	1,380
Senior Clerk	1	2,200
Unskilled Laborer	1	1,260
	2	1,170
	4	1,080
	2	1,020
10. U. S. Plant Introduction Garden, Bellingham, Washington		
Scientific Aid	1	2,100
Unskilled Laborer	1	1,560
4. Office of Crop Physiology and Breeding		
1. Headquarters, Washington, D. C.		
Senior Physiologist in Charge	1	5,200
Physiologist	1	4,400
Under Scientific Helper	1	1,260
Assistant Photographer	1	1,800
Principal Clerk	1	2,600
Senior Clerk	1	2,200
Assistant Clerk	1	1,860
Junior Clerk-stenographer	1	1,320
Under Clerk-typist	1	1,140
Messenger Girl	1	1,020
2. University of California, Berkeley, Calif.		
Translator	1	2,200
Agent	1	1,080
3. U. S. Experiment Date Garden, Indio, California		
Horticulturist	1	4,000
Associate Horticulturist	1	3,000
Scientific Aid	1	2,000

Junior Horticulturist	1	2,100
Junior Scientific Aid	1	1,680
Junior Scientific Helper	1	1,560
Unskilled Laborer	2	1,500
	2	1,440
4. Los Angeles, California		
Agriculturist	1	3,800
5. U. S. Crop Physiology Field Office, San Francisco, California		
Associate Physiologist	1	3,000
Clerk	1	1,800
6. Hongkong, China		
Translator	1	100
7. U. S. Citrus Field Experiments, Eustis, Florida		
Assistant Plant Breeder	1	2,700
Unskilled Laborer	1	1,260
Agent	1	50
8. U. S. Citrus Detention Station, Bethesda, Maryland		
Senior Scientific Aid	1	2,400
Assistant Scientific Aid	1	1,800
9. College of Agriculture, Manila, P. I.		
Agent	1	300
5. Office of Horticulture		
1. Headquarters, Washington, D. C.		
Senior Horticulturist in Charge	1	5,200
Pomologist	1	4,200
Physiologist	1	4,400
	1	4,200
	1	3,800
Horticulturist	1	4,000
	2	3,800
Associate Bacteriologist	1	3,100
Associate Biophysicist	1	3,100
Associate Horticulturist	2	3,300
	3	3,100
	2	3,000
Associate Pathologist	1	3,500
Associate Physiologist	1	3,300
Associate Pomologist	1	3,500
	1	3,300
Assistant Horticulturist	1	2,900
	1	2,600
Assistant Pomologist	1	2,700
Junior Horticulturist	1	2,200
	1	1,860

Junior Physiologist	1	2,200
Junior Pomologist	1	2,000
Junior Librarian	1	1,920
Chief Scientific Illustrator	1	2,400
Scientific Illustrator	1	1,680
Engineer Draftsman	1	1,680
Scientific Aid	1	1,740
Assistant Scientific Illustrator	1	1,500
Assistant Scientific Aid	1	1,680
Junior Library Assistant	1	1,860
Minor Scientific Helper	1	900
Junior Administrative Assistant	1	2,700
Senior Photographer	1	1,860
Clerk	2	1,920
	1	1,680
Clerk-stenographer	2	1,800
	2	1,740
	3	1,680
Assistant Clerk	3	1,680
	1	1,620
	3	1,560
	5	1,500
Junior Clerk	1	1,440
	4	1,320
Under Clerk-typist	1	1,260
	1	1,140
Assistant Messenger	1	900
Junior Messenger	1	720
	1	600
Senior Laborer	1	1,080
2. U. S. Experiment Vineyard, Fresno, California		
Associate Pomologist	1	3,000
3. U. S. Horticultural Field Laboratory, Lamanda Park, California		
Associate Physiologist	1	3,000
4. U. S. Horticultural Field Office, Los Angeles, California		
Pomologist	1	4,000
5. U. S. Experiment Vineyard, Oakville, California		
Superintendent	1	2,100
Unskilled Laborer	1	1,200
6. U. S. Horticultural Field Office, Riverside, California		
Senior Physiologist	1	5,200
Associate Pomologist	1	3,100

	Assistant Pomologist	1	2,500
	Junior Pomologist	1	1,860
	Assistant Clerk	1	1,500
7.	Stanford University, California		
	Associate Botanist	1	3,500
8.	U. S. Horticultural Field Office, Sacramento, California		
	Associate Pomologist	1	3,100
		1	3,000
	Assistant Clerk	1	1,560
9.	U. S. Cotton Field Station, Shafter, California		
	Pomologist	1	3,800
	Laborer	1	1,200
10.	Colorado Potato Experiment Station, Greeley, Colorado		
	Associate Horticulturist	1	3,100
	Unskilled Laborer	1	1,250
		1	1,000
11.	U. S. Pecan Field Station, Philema, Ga.		
	Assistant Pomologist	1	2,800
	Junior Clerk	1	1,380
	Laborer	1	660
		1	468
12.	South Bend, Indiana		
	Field Assistant	1	540
13.	U. S. Horticultural Field Station, Bell, Maryland		
	Associate Pomologist	1	3,600
	Assistant Pomologist	1	2,400
	Gardener	1	1,620
	Unskilled Laborer	1	1,450
		1	1,330
		2	1,060
14.	South Haven Branch Station, Agricultural Experiment Station, South Haven, Michigan		
	Agent	1	1,080
15.	Coastal-Plain Branch Station, Willard, North Carolina		
	Associate Horticulturist	1	3,000
16.	Pee Dee Substation, Agricultural Experiment Station, Florence, S. C.		
	Agent	1	1,500
17.	Troupe, Texas		
	Collaborator	1	12

18. U. S. Arlington Experiment Farm, Rosslyn, Virginia		
Assistant Physiologist	1	2,900
Assistant Marketing Specialist	1	2,400
Mechanic	1	2,000
Assistant Mechanic	1	1,680
Gardener	2	1,320
Field Assistant	1	1,320
Unskilled Laborer	1	1,590
	1	1,330
	1	1,250
19. Virginia Truck Experiment Station, Diamond Springs, Norfolk, Virginia		
Collaborator	1	30
20. U. S. Plant Introduction Garden, Bellingham, Washington		
Scientific Aid	1	1,800
	1	1,200
	1	840
21. Wenatchee, Washington		
Assistant Physiologist	1	2,400
6. Office of Alkali and Drought-Resistant Crops		
1. Headquarters, Washington, D. C.		
Senior Physiologist in Charge	1	5,200
Clerk	1	1,860
2. Torrey Pines (San Diego), California		
Head Gardener	1	1,740
3. U. S. Field Station, Sacaton, Arizona		
Principal Scientific Aid	1	2,700
Scientific Aid	1	2,040
Assistant Scientific Aid	1	1,800
7. Office of Cotton, Rubber, and Other Tropical Plants		
1. Headquarters, Washington, D. C.		
Senior Botanist in Charge	1	5,200
Agronomist	1	4,000
Chief Scientific Aid	1	2,800
Senior Scientific Aid	1	2,100
	1	1,980
Assistant Scientific Aid	1	1,500
Principal Clerk	1	2,600
Assistant Clerk-stenographer	1	1,680
	2	1,500
Junior Clerk	3	1,320
Under Operative	1	1,380

2.	U. S. Field Station, Sacaton, Arizona (Pima Indian Reservation and Salt River and nearby valleys of Arizona)		
	Associate Agronomist	1	3,300
	Associate Technologist	1	3,100
	Assistant Physiologist	1	2,700
	Assistant Agronomist	1	2,500
	Junior Agronomist	1	1,860
	Assistant Scientific Aid	1	1,680
3.	U. S. Acclimatization Garden, Bard Mesa, California (Arizona, California, Nevada and Northern Mexico)		
	Principal Scientific Aid	1	2,100
	Assistant Scientific Aid	1	1,620
		1	1,500
	Unskilled Laborer	1	1,200
4.	U. S. Experiment Date Garden, Indio, California (Coachella and nearby valleys of Southern California)		
	Junior Agronomist	1	2,200
5.	U. S. Cotton Field Station, Shafter, California (San Joaquin and neighboring valleys of California, also general work in Arizona and California)		
	Associate Agronomist	1	3,500
	Senior Scientific Aid	1	2,400
	Assistant Scientific Aid	1	1,560
	Unskilled Laborer	1	1,320
	Farm Laborer	1	1,500
		1	1,200
	Caretaker	1	540
6.	U. S. San Diego Acclimatization Garden, Torrey Pines, California		
	Assistant Agronomist	1	2,600
	Senior Scientific Aid	1	2,000
	Unskilled Laborer	1	1,380
		1	540
	Teamster	1	1,140
7.	U. S. Plant Introduction Garden, Chapman Field, Coconut Grove, Florida		
	Assistant Horticulturist	1	2,000
8.	Bayeux, Haiti		
	Agent	1	1,860

9. Thor, Haiti		
Technologist	1	3,800
10. U. S. Cotton Breeding Field Station, State College, New Mexico		
Chief Scientific Aid	1	2,800
11. U. S. Cotton Breeding Field Station, James Island, South Carolina (Southeastern states)		
Assistant Agronomist	1	2,700
Principal Scientific Aid	1	2,200
Senior Scientific Aid	1	2,200
Farm Laborer	1	480
Foreman Laborer	1	1,200
12. U. S. Cotton Breeding Field Station, Greenville, Texas (Louisiana, Texas, Oklahoma, Arkansas, and New Mexico)		
Assistant Agronomist	1	2,800
Assistant Pomologist	1	2,400
Senior Scientific Aid	1	2,000
Unskilled Laborer	1	1,260
	1	600
8. Office of Fiber Plants		
1. Headquarters, Washington, D. C.		
Botanist in Charge	1	4,400
Technologist	1	4,000
Clerk	1	1,740
Assistant Clerk	1	1,500
2. Agricultural College and Agricultural Experiment Station, East Lansing, Michigan		
Junior Plant Breeder	1	1,860
3. Agricultural Experiment Station, Mayaguez, Porto Rico		
Agent	1	2,100
4. Agricultural Experiment Station, Madison, Wisconsin		
Agent	1	1,800
9. Office of Cereal Crops and Diseases		
1. Headquarters, Washington, D. C.		
Senior Agronomist in Charge	1	5,600
Senior Pathologist	2	5,200
Senior Agronomist	1	5,200
Agronomist	1	4,600
	1	4,400
	2	4,200
	1	4,000
	1	3,800

Pathologist	1	4,000
Associate Pathologist	1	3,600
	1	3,300
	2	3,100
	1	3,000
Associate Agronomist	2	3,400
	1	3,200
	1	3,100
	3	3,000
Associate Physiologist	1	3,100
Assistant Pathologist	1	2,600
Assistant Agronomist	1	3,000
	1	2,600
Assistant Botanist	1	2,700
Junior Biochemist	1	1,860
Junior Agricultural Statistician	1	1,860
Senior Scientific Aid	1	2,100
Scientific Aid	1	1,860
Minor Scientific Helper	1	1,260
Junior Administrative Assistant	1	2,800
Senior Clerk	2	2,200
Senior Clerk-stenographer	1	1,860
Clerk-stenographer	2	1,920
	1	1,800
	3	1,740
Assistant Clerk	1	1,740
Assistant Clerk-stenographer	1	1,680
	9	1,560
	1	1,500
Junior Clerk	2	1,500
	1	1,440
Messenger	1	900
2. Agricultural Experiment Station, Berkeley, California		
Associate Pathologist	1	3,200
Assistant Pathologist	1	2,700
Junior Clerk	1	1,380
3. Biggs Rice Field Station, Biggs, Calif.		
Associate Agronomist	1	3,200
Laborer	1	1,440
4. State Experiment Farm, Davis, Calif.		
Associate Agronomist	1	3,200
5. College of Agriculture, Fort Collins, Col.		
Assistant Pathologist	1	2,600
6. State College of Agriculture, Athens, Ga.		
Agent	1	900
Laborer	1	720

7.	Aberdeen Substation, Agricultural Experiment Station, Aberdeen, Idaho		
	Assistant Agronomist	1	2,400
	Laborer	1	840
8.	Agricultural Experiment Station and College of Agriculture, Moscow, Idaho		
	Agent	1	1,220
		1	1,050
9.	U. S. Cereal-Pathology Field Experiments, Bloomington, Illinois		
	Agronomist	1	4,000
	Assistant Clerk	1	1,500
	Unskilled Laborer	1	1,740
		1	1,200
10.	College of Agriculture, Extension Service, Urbana, Illinois		
	Associate Pathologist	1	3,000
	Junior Clerk	1	1,320
11.	Agricultural Experiment Station and College of Agriculture, Purdue, University, LaFayette, Indiana		
	Pathologist	1	4,320
	Associate Pathologist	1	3,000
	Associate Agronomist	1	3,000
	Assistant Pathologist	1	2,500
		1	2,400
	Assistant Clerk	2	1,560
		1	1,500
	Agent	1	2,600
		1	1,920
		1	1,020
		1	900
		1	780
		1	500
12.	Agricultural Experiment Station and College of Agriculture, Ames, Iowa		
	Associate Agronomist	1	3,000
	Assistant Agronomist	1	2,600
	Assistant Pathologist	1	2,900
	Junior Clerk	1	1,320
	Agent	1	2,500
		1	1,800
		1	720
13.	Fort Hays Branch Station, Agricultural Experiment Station, Hays, Kansas		
	Assistant Agronomist	1	2,700

14.	Agricultural Experiment Station, Manhattan, Kansas		
	Associate Agronomist	1	3,200
	Associate Pathologist	1	3,000
	Assistant Agronomist	1	2,500
	Assistant Pathologist	1	2,500
	Agent	1	1,260
		1	1,020
	Assistant Clerk	1	1,500
	Laborer	1	960
15.	Agricultural Experiment Station, Baton Rouge, Louisiana		
	Assistant Agronomist	1	2,600
16.	Rice Experiment Station, Crowley, La.		
	Assistant Agronomist	1	2,400
17.	U. S. Horticultural Field Station, Bell, Maryland		
	Assistant Horticulturist	1	2,400
18.	Agricultural College and Agricultural Experiment Station, East Lansing, Michigan		
	Associate Pathologist	1	3,100
	Assistant Clerk	1	1,500
19.	Minneapolis, Minnesota		
	Associate Pathologist	1	3,100
20.	Agricultural Experiment Station and College of Agriculture, St. Paul, Minnesota		
	Associate Pathologist	1	3,300
		1	3,200
		1	3,100
	Assistant Pathologist	1	2,700
	Junior Agronomist	1	2,200
	Collaborator	2	300
	Clerk	1	1.560
		1	1,500
	Agent	1	1,320
		1	1,260
		1	1,200
		1	1,110
		1	1,100
21.	Agricultural Experiment Station, Columbia, Missouri		
	Agent	1	400

22.	College of Agriculture, Bozeman, Mont.		
	Agent	1	2,300
		1	750
		1	700
	Laborer	1	300
23.	North Montana Substation, Agricultural Experiment Station, Havre, Mont.		
	Laborer	1	150
24.	Judith Basin Substation, Montana Agricultural Experiment Station, Moccasin, Montana		
	Assistant Agronomist	1	2,600
25.	College of Agriculture, Lincoln, Neb.		
	Associate Pathologist	1	3,000
	Under Clerk-typist	1	1,140
26.	North Platte Experiment Substation, North Platte, Nebraska		
	Junior Agronomist	1	1,860
27.	Agricultural Experiment Station. Cornell University, Ithaca, New York		
	Associate Cytologist	1	3,000
	Agent	1	1,800
		1	900
28.	Agricultural College, Fargo, N. D.		
	Associate Pathologist	1	3,100
	Assistant Pathologist	1	2,400
29.	Dickinson Substation, Agricultural Experiment Station, Dickinson, N. D.		
	Associate Agronomist	1	3,000
30.	U. S. Northern Great Plains Field Station, Mandan, North Dakota		
	Assistant Agronomist	1	2,500
	Junior Agronomist	1	1,860
31.	College of Agriculture, Columbus, Ohio		
	Associate Pathologist	1	3,100
	Agent	1	900
	Assistant Clerk	1	1,500
32.	U. S. Dry-Land Field Station, Woodward, Oklahoma		
	Associate Agronomist	1	3,000
33.	Agricultural Experiment Station, Corvallis, Oregon		
	Laborer	2	960
34.	Sherman County Branch Station, Agricultural Experiment Station, Moro, Oregon		
	Agronomist	1	4,100

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35. College of Agriculture, Extension Service, Brookings, South Dakota		
Agent	1	2,600
Junior Clerk	1	1,320
36. Agricultural Experiment Station, Knoxville, Tennessee		
Assistant Agronomist	1	2,400
37. U. S. Arlington Experiment Farm, Rosslyn, Virginia		
Associate Agronomist	1	3,000
Associate Pathologist	2	3,000
Associate Physiologist	1	3,000
Junior Scientific Aid	1	1,560
Laborer	1	1,400
	1	1,000
38. Agricultural Experiment Station, Pullman, Washington		
Agent	1	825
39. Agricultural Experiment Station, Madison, Wisconsin		
Pathologist	1	3,800
Assistant Pathologist	1	2,900
	1	2,600
	1	2,400
Assistant Scientific Aid	1	1,740
Assistant Clerk	1	1,620
	1	1,500
Agent	1	2,100
	1	800
10. Office of Forage Crops		
1. Headquarters, Washington, D. C.		
Senior Agronomist in Charge	1	5,600
Agronomist	1	4,200
	2	4,000
	1	3,800
Assistant Agronomist	1	3,200
Assistant Botanist	1	2,800
Senior Scientific Aid	1	2,100
Scientific Illustrator	1	1,860
Under Scientific Helper	1	1,380
Junior Administrative Assistant	1	2,800
Principal Clerk	1	2,300
Clerk	1	1,920
	1	1,800
	1	1,740
	1	1,680

	Assistant Clerk	3	1,680
		1	1,560
		1	1,500
	Under Clerk	1	1,260
	Office Laborer	1	300
	Senior Laborer	2	1,020
	Junior Messenger	1	600
2.	Gainesville, Florida		
	Agent	1	720
	Unskilled Laborer	1	480
3.	Fort Hays Branch Station, Agricultural Experiment Station, Hays, Kansas		
	Associate Agronomist	1	3,200
4.	Agricultural College and Agricultural Experiment Station, Urbana, Illinois		
	Junior Agronomist	1	1,860
5.	Coastal Plain Experiment Station, McNeill, Mississippi		
	Assistant Agronomist	1	2,500
	Unskilled Laborer	1	840
		1	550
6.	West Point, Mississippi		
	Agent	1	2,000
	Field Assistant	1	1,320
	Unskilled Laborer	1	800
7.	Judith Basin Substation, Montana Agricultural Experiment Station, Moccasin, Montana		
	Assistant Agronomist	1	2,500
8.	Timothy-Breeding Field Experiments, North Ridgeville, Ohio		
	Associate Agronomist	1	3,000
	Agent	1	725
	Unskilled Laborer	1	700
9.	Agricultural Experiment Station, Corvallis, Oregon		
	Assistant Agronomist	1	2,500
10.	U. S. Forage-Crop Field Experiments, Redfield, South Dakota		
	Associated Agronomist	1	3,000
	Unskilled Laborer	1	500
11.	State Substation No. 12, Chilicothe, Tex.		
	Junior Agronomist	1	1,860
12.	U. S. Arlington Experiment Farm, Rosslyn, Virginia		
	Scientific Aid	2	1,860

13. Pullman, Washington		
Agent	1	500
14. Waterville, Washington		
Agent	1	1,575
11. Office of Drug, Poisonous, and Oil Plants		
Senior Physiologist in Charge	1	——
Biochemist	2	3,800
Associate Biochemist	1	3,400
Assistant Biochemist	1	3,000
Assistant Botanist	1	2,700
Junior Biochemist	1	2,200
Senior Scientific Aid	1	1,860
Minor Scientific Helper	1	900
Clerk	2	1,800
Assistant Clerk-stenographer	1	1,560
	1	1,500
Junior Messenger	1	600
12. Office of Plant Geography and Physiology		
1. Headquarters, Washington, D. C.		
Senior Physiologist in Charge	1	5,200
Associate Physiologist	1	3,100
Associate Biochemist	2	3,100
Assistant Physiologist	1	2,800
Junior Scientific Aid	1	1,320
Minor Scientific Helper	1	900
Senior Clerk	1	2,300
Assistant Clerk Stenographer	1	1,500
2. Chula Vista, California		
Assistant Scientific Aid	1	1,560
13. Office of Sugar Plants		
1. Headquarters, Washington, D. C.		
Senior Pathologist in Charge	1	5,200
Pathologist	1	4,000
Associate Technologist	1	3,200
Associate Pathologist	1	3,000
Associate Biochemist	1	3,000
Associate Cytologist	1	2,400
Assistant Pathologist	1	2,800
Senior Clerk	1	1,920
Clerk	2	1,740
Assistant Clerk-stenographer	1	1,560
	1	1,500
Junior Clerk-typist	1	1,440
Junior Messenger	1	600
Minor Scientific Helper	1	900
Assistant Messenger	1	900

2. U. S. Sugar-Plant Field Laboratory, Fort Smith, Arkansas		
Assistant Agronomist	1	2,800
Unskilled Laborer	1	420
3. Citrus Experiment Station, Riverside, California		
Associate Pathologist	1	3,600
Junior Pathologist	1	1,860
4. U. S. Sugar-Plant Field Experiments, Fort Collins, Colorado		
Assistant Agronomist	1	2,800
Unskilled Laborer	1	1,000
	1	900
	1	840
5. U. S. Sugar-Plant Field Experiments, Rocky Ford, Colorado		
Pathologist	1	4,600
Junior Pathologist	1	2,200
Unskilled Laborer	1	1,000
	1	400
6. U. S. Sugar-Plant Field Experiments, Canal Point, Florida		
Assistant Pathologist	1	2,700
Agent	1	1,800
Unskilled Laborer	2	780
7. U. S. Sugar-Plant Field Experiments, Cairo, Georgia		
Unskilled Laborer	1	1,020
	2	780
8. U. S. Sugar-Plant Field Experiments, Houma, Louisiana		
Associate Agronomist	1	3,000
Unskilled Laborer	1	720
9. Agricultural College and Agricultural Experiment Station, East Lansing, Michigan		
Assistant Agronomist	1	3,000
Agent	1	1,000
	1	300
10. Agricultural Experiment Station, Messilla Park, New Mexico		
Agent	1	720
11. U. S. Sugar-Plant Field Experiments, Salt Lake City, Utah		
Associate Agronomist	2	3,000
Assistant Pathologist	1	2,600
Unskilled Laborer	1	900

14. Office of Dry Land Agriculture		
1. Headquarters, Washington, D. C.		
Senior Agriculturist in Charge	1	5,600
Agronomist in Charge	1	4,000
Collaborator	2	none
Principal Clerk	1	2,600
Clerk	1	1,980
Assistant Clerk	1	1,740
	1	1,560
Junior Messenger	1	720
2. Field Stations		
1. U. S. Dry-Land Field Station, Akron, Colorado		
Associate Agronomist	1	3,100
Unskilled Laborer	1	1,455
2. U. S. Dry-Land Field Station, Tucumcari, New Mexico		
Associate Agronomist	1	3,100
Unskilled Laborer	1	1,200
3. U. S. Northern Great Plains Field Station, Mandan, N. D.		
Senior Agronomist	1	5,200
Associate Agronomist	2	3,500
	2	3,500
Scientific Aid	1	2,100
Senior Clerk	1	2,200
Unskilled Laborer	2	1,500
	2	1,380
	1	1,320
4. U. S. Dry-Land Field Station, Lawton, Oklahoma		
Associate Agronomist	1	3,500
Unskilled Laborer	1	1,200
5. U. S. Dry-Land Field Station, Woodward, Oklahoma		
Agriculturist	1	4,600
Assistant Agronomist	1	3,100
Unskilled Laborer	1	1,236
	1	1,017
6. U. S. Dry-Land Field Station, Ardmore, South Dakota		
Associate Agronomist	1	3,600
Senior Scientific Aid	1	2,300
Unskilled Laborer	1	1,500
	1	1,260

7. U. S. Dry-Land Field Station, Big Spring, Texas		
Associate Agronomist	1	3,300
Unskilled Laborer	1	1,408
	1	1,200
8. U. S. Dry-Land Field Station, Dalhart, Texas		
Associate Agronomist	1	3,300
Unskilled Laborer	1	1,200
	1	1,020
9. U. S. Dry-Land Field Station, Sheridan, Wyoming		
Associate Agronomist	1	3,500
Unskilled Laborer	1	1,080
3. Coöperative Field Stations		
1. Colby Branch Station, Agricultural Experiment Station, Colby, Kan.		
Agent	1	3,200
2. Garden City Branch Station, Agricultural Experiment Station, Garden City, Kansas		
Agent	1	3,200
3. Fort Hays Branch Station, Agricultural Experiment Station, Hays, Kansas		
Associate Agronomist	1	3,300
4. Northern Montana Substation, Agricultural Experiment Station, Havre, Montana		
Associate Agronomist	1	3,400
5. U. S. Huntley Field Station, Huntley, Montana		
Associate Agronomist	1	3,300
6. Judith Basin Substation, Montana Agricultural Experiment Station, Moccasin, Montana		
Associate Agronomist	1	3,200
7. North Platte Experiment Substation, North Platte, Nebraska		
Associate Agronomist	1	3,200
Junior Agronomist	1	1,860
8. Dickinson Substation, Agricultural Experiment Station, Dickinson, North Dakota		
Associate Agronomist	1	3,300

9. U. S. Belle Fourche Field Station, Newell, South Dakota		
Associate Agronomist	1	3,200
10. Cheyenne Experiment Farm, Archer, Wyoming		
Associate Agronomist	1	3,000
15. Office of Western Irrigation Agriculture		
1. Headquarters, Washington, D. C.		
Senior Agriculturist in Charge	1	5,200
Senior Clerk	1	2,200
Assistant Clerk	1	1,740
	1	1,560
2. Agricultural Experiment Station, Tucson, Arizona		
Biochemist	1	3,800
3. U. S. Yuma Field Station, Bard, Calif.		
Associate Agronomist	1	3,200
Junior Agronomist	1	2,100
Unskilled Laborer	2	1,200
	1	1,140
	1	1,080
Mess Cook	1	600
4. U. S. Huntley Field Station, Huntley, Montana		
Associate Agronomist	1	3,100
Chief Scientific Assistant	1	2,600
Assistant Mechanic	1	1,800
Unskilled Laborer	1	1,140
5. U. S. Scotts Bluff Field Station, Mitchell, Nebraska		
Associate Agronomist	1	3,100
Clerk	1	2,200
Unskilled Laborer	1	1,440
	1	1,260
	1	1,080
Mess Cook	1	960
6. U. S. Newlands Field Station, Fallon, Nevada		
Junior Agronomist	1	2,400
Unskilled Laborer	3	1,200
Mess Cook	1	480
7. U. S. Umatilla Field Station, Hermiston, Oregon		
Associate Agronomist	1	3,200
8. U. S. Belle Fourche Field Station, Newell, South Dakota		
Associate Agronomist	1	3,300

Assistant Clerk	1	1,680
Unskilled Laborer	1	1,380
	1	1,000
9. U. S. San Antonio Field Station, San Antonio, Texas		
Associate Agronomist	1	3,200
Junior Pomologist	1	2,000
Assistant Clerk	1	1,560
Unskilled Laborer	1	1,020
	1	900
Mess Cook	1	480
10. State Irrigation Experiment Station, Prosser, Washington		
Associate Agronomist	1	2,500
16. Office of Botany		
Senior Botanist in Charge	1	5,200
Senior Botanist	1	5,200
Botanist	1	3,800
Associate Botanist	1	3,300
	1	3,000
Assistant Librarian	1	2,500
Assistant Botanist	1	2,400
Junior Botanist	1	1,860
Senior Scientific Aid	1	2,100
Under Scientific Helper	1	1,260
Clerk	2	1,860
Assistant Clerk	1	1,560
	2	1,500
17. Office of Nematology		
1. Headquarters, Washington, D. C.		
Senior Nematologist in Charge	1	5,200
Nematologist	1	3,800
Assistant Pathologist	1	2,800
Junior Nematologist	1	1,920
	3	1,860
Senior Laboratory Mechanic	1	2,300
Laboratory Mechanic	1	2,040
Junior Scientific Aid	1	1,620
	2	1,440
	2	1,380
	2	1,320
Minor Scientific Helper	1	900
Senior Clerk	1	1,860
Clerk-Stenographer	1	1,740
Assistant Messenger	1	900
2. Eastern Field Station, Falls Church, Va.		
Associate Nematologist	1	3,100

3.	Salt Lake City, Utah		
	Assistant Nematologist	1	2,600
18.	Biophysical Laboratory		
	Senior Botanist in Charge	1	5,200
	Associate Biophysicist	1	3,000
	Associate Botanist	1	3,000
	Assistant Physiologist	1	2,900
	Assistant Biophysicist	1	2,600
	Assistant Botanist	1	2,900
	Senior Laboratory Mechanic	1	2,000
	Assistant Scientific Aid	1	1,740
	Minor Scientific Helper	1	1,080
	Clerk	1	1,920
	Assistant Clerk	1	1,500
	Junior Messenger	1	720
19.	Office of Pathological Laboratory		
	Senior Pathologist in Charge	1	5,600
	Associate Pathologist	1	3,100
	Assistant Pathologist	3	3,000
		1	2,800
		1	2,400
	Junior Pathologist	1	2,200
		2	2,100
	Chief Scientific Illustrator	1	2,400
	Senior Scientific Aid	1	2,200
	Minor Scientific Aid	2	1,140
	Clerk-Stenographer	1	1,680
	Assistant Clerk-Stenographer	1	1,620
	Translator	1	480
20.	Office of Mycology and Disease Survey		
	Senior Pathologist in Charge	1	5,200
	Pathologist	1	4,000
	Associate Pathologist	1	3,200
		1	3,000
	Assistant Pathologist	1	2,800
		2	2,700
		1	2,400
	Junior Pathologist	1	2,200
		1	2,100
	Junior Library Assistant	2	1,500
	Assistant Scientific Aid	1	1,500
	Junior Scientific Aid	1	1,320
	Under Scientific Helper	1	1,500
	Minor Scientific Helper	1	1,140
	Senior Clerk	1	2,300
		1	2,200
	Clerk	1	1,800

Assistant Clerk	1	1,560
	3	1,500
Junior Clerk	1	1,500
	1	1,440
Junior Messenger	1	660
21. Office of Fruit Diseases		
Senior Pathologist in Charge	1	5,400
Senior Pathologist	1	5,200
	1	5,200
Pathologist	1	4,600
	1	4,400
	1	4,000
	1	3,800
Associate Botanist	1	3,000
Associate Pathologist	2	3,500
Assistant Pathologist	1	2,900
Junior Pathologist	1	2,300
	1	2,000
	1	1,920
Assistant Scientific Aid	1	1,620
Under Scientific Helper	1	900
Senior Clerk	1	2,100
Assistant Clerk-stenographer	1	1,560
	2	1,500
Junior Clerk-typist	1	1,320
2. U. S. Fruit-Disease Field Laboratory, Fresno, California		
Pathologist	1	4,000
Field Assistant	1	675
3. U. S. Citrus-Disease Field Laboratory, Orlando, Florida		
Pathologist	1	3,800
Junior Pathologist	1	2,100
Unskilled Laborer	1	1,020
Field Assistant	1	800
4. U. S. Peach-Disease Field Laboratory, Fort Valley, Georgia		
Associate Pathologist	1	3,200
Assistant Pathologist	1	2,400
5. U. S. Pecan-Disease Field Laboratory, Thomasville, Georgia		
Associate Pathologist	1	3,100
Junior Pathologist	1	2,000
Stenographer	1	960
6. Markets Pathology Field Laboratory, Chicago, Illinois		
Junior Pathologist	1	1,860

7. U. S. Fruit-Disease Laboratory, Vincennes, Indiana		
Senior Scientific Aid	1	2,200
8. U. S. Cranberry-Disease Field Laboratory, East Wareham, Massachusetts		
Field Assistant	1	500
9. U. S. Raspberry-Disease Field Laboratory, Wooster, Ohio		
Assistant Pathologist	1	2,800
10. U. S. Cranberry-Disease Field Laboratory, Seaside, Oregon		
Assistant Pathologist	1	2,800
11. U. S. Fruit-Disease Field Laboratory, Wenatchee, Washington		
Pathologist	1	3,800
Field Assistant	1	1,080
22. Office of Citrus-Canker Eradication		
1. Headquarters, Washington, D. C.		
Associate Chief of Bureau in Charge	1	——
Clerk	1	1,860
2. Field Work		
Field work is performed by inspectors, (appointed each year for temporary periods), in the following states: Alabama, Florida, Louisiana, Mississippi, and Texas.		
23. Office of Vegetable and Forage Diseases		
1. Headquarters, Washington, D. C.		
Senior Pathologist in Charge	1	5,200
Pathologist	1	4,600
	1	4,400
	1	3,800
Associate Physiologist	1	3,300
Associate Pathologist	1	3,300
	1	3,200
	1	3,000
Assistant Pathologist	1	2,600
Junior Pathologist	1	2,300
	1	1,860
Scientific Aid	1	1,860
Assistant Scientific Aid	1	1,500
Junior Scientific Aid	1	1,320
Minor Scientific Aid	1	1,080
Principal Clerk	1	2,500
Senior Clerk-stenographer	1	1,860
Assistant Clerk-stenographer	2	1,500

Junior Clerk	1	1,440
Junior Clerk-typist	1	1,320
Assistant Messenger	1	1,020
2. U. S. Experiment Station, Chula Vista, California		
Pathologist	1	3,800
3. Citrus Experiment Station, Riverside, California		
Pathologist	1	3,800
Scientific Aid	1	1,920
4. Colorado Potato Experiment Station, Greeley, Colorado		
Pathologist	1	3,800
Assistant Pathologist	1	2,600
5. U. S. Truck-Crop Disease Field Laboratory, Sanford, Florida		
Assistant Pathologist	1	3,400
Agent	1	1,500
6. Markets Pathology Field Laboratory, Chicago, Illinois		
Pathologist	1	3,800
Associate Pathologist	1	3,300
Junior Pathologist	1	2,200
7. College of Agriculture, Manhattan, Kan.		
Associate Pathologist	1	3,400
Agent	1	1,200
8. Agricultural Experiment Station, Corvallis, Oregon		
Junior Pathologist	1	1,860
Agent	1	3,200
9. Agricultural Experiment Station, Madison, Wisconsin		
Pathologist	2	3,800
	1	4,000
Associate Pathologist	1	3,000
Agent	1	1,200
	1	1,100
24. Office of Forest Pathology		
1. Headquarters, Washington, D. C.		
Senior Pathologist in Charge	1	5,200
Pathologist	1	4,400
	1	3,800
Associate Pathologist	1	3,100
Assistant Pathologist	1	2,800
	1	2,400
Junior Pathologist	1	2,200
Senior Scientific Aid	1	1,860

	Assistant Scientific Aid	1	1,560
	Minor Scientific Helper	1	960
	Senior Clerk	1	2,200
	Clerk	1	1,740
		1	2,100
	Assistant Clerk	2	1,500
	Under Clerk-typist	1	1,140
2.	U. S. Forest-Pathology Field Station, San Francisco, California		
	Pathologist	1	4,200
	Assistant Pathologist	1	2,400
	Assistant Clerk	1	1,500
3.	Amherst, Massachusetts		
	Pathologist	1	4,000
4.	U. S. Forest-Pathology Field Station Office, Albuquerque, New Mexico		
	Pathologist	1	3,800
	Clerk	1	1,680
5.	Albany, New York		
	Collaborator	1	none
6.	Asheville, North Carolina		
	Associate Pathologist	1	3,500
7.	U. S. Forest-Pathology Field Office, Portland, Oregon		
	Pathologist	1	4,000
	Assistant Pathologist	1	2,700
	Junior Pathologist	2	1,860
	Field Assistant	2	600
8.	U. S. Forest-Pathology Field Office, Providence, Rhode Island		
	Pathologist	1	4,000
	Associate Pathologist	1	3,000
	Junior Pathologist	1	1,860
	Junior Clerk	1	1,320
	Field Assistant	1	620
		1	440
9.	Edinburgh, Scotland		
	Specialist in Forest Tree Diseases	1	600
10.	U. S. Forest-Pathology Field Office, Madison, Wisconsin		
	Pathologist	1	4,000
	Assistant Pathologist	1	2,700
		1	2,600
	Junior Scientific Aid	1	1,440
	Unskilled Laborer	1	1,440

25. Blister Rust Control

1. Headquarters, Washington, D. C.		
Senior Pathologist	1	5,200
Pathologist	1	4,200
Associate Pathologist	1	3,600
	1	3,100
Junior Plant Quarantine Inspector	1	2,100
Senior Clerk	1	2,200
Clerk	1	1,860
Assistant Clerk	1	1,740
	5	1,560
	1	1,500
Junior Clerk-stenographer	1	1,320
Messenger	1	1,020
	1	900
	1	600
2. Agricultural Experiment Station, New Haven, Connecticut		
Assistant Pathologist	1	2,500
Senior Scientific Aid	1	1,920
Agent	1	1,500
3. State Forest Service, Augusta, Maine		
Associate Pathologist	1	3,000
Agent	4	2,040
4. State Department of Agriculture, Boston, Massachusetts		
Associate Pathologist	1	3,600
Agent	1	3,000
Assistant Pathologist	1	2,600
Agent	2	2,280
	1	2,160
	1	2,100
	2	1,920
	1	1,800
	1	1,560
5. State Forestry Department, Concord, New Hampshire		
Agent	1	3,000
	1	2,280
	3	2,040
	1	1,955
	2	1,920
	1	1,860
6. Conservation Commission, Albany, New York		
Agent	1	3,000
	1	2,600

		1	2,000
		2	1,920
		4	1,800
		2	1,740
7.	State Board of Agriculture, Providence, Rhode Island		
	Agent	1	2,100
8.	State Forest Service, Montpelier, Vt.		
	Agent	3	1,800
9.	Spokane Office, Spokane, Washington		
	Pathologist	1	3,800
	Associate Pathologist	1	3,200
	Assistant Pathologist	3	2,700
		3	2,600
	Principal Clerk	1	2,400
	Junior Pathologist	1	1,860
	Junior Forester	2	1,860
	Assistant Clerk	1	1,560
	Under Clerk-Typist	1	1,140
10.	State Department of Agriculture, Office of State Entomologist, Madison, Wisconsin		
	Agent	1	2,440
26.	Office of Gardens and Grounds		
	Chief Scientific Assistant in Charge	1	2,500
	Senior Foreman Gardener	1	2,100
	Foreman Gardener	1	1,740
	Head Gardener	1	1,680
		7	1,560
		3	1,500
	Gardener	2	1,440
		3	1,380
		2	1,320
	Assistant Gardener	1	1,380
		6	1,200
		15	1,140
	Assistant Clerk	1	1,680
	Mechanic	1	1,800
	Junior Mechanic	1	1,440
		1	1,320
	Minor Mechanic	1	1,080
	Senior Laborer	1	1,080
		3	1,020
	Junior Laborer	2	1,020
		2	960
		4	900
	Junior Messenger	1	600

27. Arlington Experiment Farm, Rosslyn, Va.		
Horticulturist and Superintendent	1	4,000
Associate Horticulturist	1	3,000
Principal Scientific Aid	1	2,100
Senior Mechanic	1	2,100
Senior Foreman Gardener	1	2,100
Mechanic	1	1,950
	1	1,900
	1	1,800
Plumber	1	1,900
	2	1,680
Head Gardener	1	1,860
Gardener	1	1,500
	1	1,440
	4	1,320
Junior Mechanic	2	1,380
Painter	1	1,500
Senior Clerk	1	2,300
Assistant Clerk-stenographer	1	1,560
28. Office of Soil Fertility[1]		
1. Headquarters, Washington, D. C.		
Senior Biochemist in Charge	1	5,200
Biochemist	2	4,000
	1	3,800
Associate Biochemist	1	3,200
	1	3,000
Assistant Biochemist	1	2,900
	1	2,800
	2	2,500
	1	2,400
Junior Scientific Aid	1	1,320
Clerk	1	1,680
Junior Clerk	1	1,500
Senior Laborer	1	1,020
2. Soil-Fertility Fertilizer Experiments with Potatoes, New Brunswick, New Jersey		
Agent	1	300
3. U. S. Arlington Experiment Farm, Rosslyn, Virginia		
Foreman Gardener	1	1,860
29. Office of Soil Bacteriology[1]		
Associate Chief of Bureau in Charge	1	——
Associate Physiologist	1	3,400
	1	3,300
	1	3,100

[1] Transferred to Bureau of Chemistry and Soils, July, 1, 1927.

Associate Bacteriologist	1	3,500
Assistant Biochemist	1	2,400
Junior Bacteriologist	1	2,300
Assistant Clerk	1	1,500
Junior Clerk-typist	1	1,500
Under Scientific Helper	1	1,380
Minor Scientific Helper	1	1,020
	4	960

APPENDIX 2

CLASSIFICATION OF ACTIVITIES

Explanatory Note

The Classifications of Activities in this series have for their purpose to list and classify in all practicable detail the specific activities engaged in by the several services of the national government. Such statements are of value from a number of standpoints. They furnish, in the first place, the most effective showing that can be made in brief compass of the character of the work performed by the service to which they relate. Secondly, they lay the basis for a system of accounting and reporting that will permit the showing of total expenditures classified according to activities. Finally, taken collectively, they make possible the preparation of a general or consolidated statement of the activities of the government as a whole. Such a statement will reveal in detail, not only what the government is doing, but the services in which the work is being performed. For example, one class of activities that would probably appear in such a classification is that of "scientific research." A subhead under this class would be "chemical research." Under this head would appear the specific lines of investigation under way and the services in which they were being prosecuted. It is hardly necessary to point out the value of such information in planning for future work and in considering the problem of the better distribution and coördination of the work of the government. The institute contemplates attempting such a general listing and classification of the activities of the government upon the completion of the present series.

Classification of Activities

1. Research
    1. Investigations in plant nutrition
    2. Investigations and introduction of foreign plants
    3. Plant breeding and selection

4. Investigations to determine improved cultural methods
5. Investigations to determine improved methods of crop-handling
6. Investigations to promote the utilization of plants and plant products
7. Investigations in systematic botany
8. Investigations in plant physiology
9. Investigations in ecology
10. Investigations in plant diseases
    1. Pathology
    2. Mycology
    3. Nematology

2. Regulation
    1. Inspection of commercial forage-plant seeds
    2. Inspection of foreign forage-plant seeds tendered for entry
3. Service in coöperation with state regulatory authorities
    1. Inspection of trees for presence of citrus canker
    2. Inspection of nurseries and nursery stock and scouting for white-pine blister rust and infected currant and gooseberry plants.
    3. Scouting for rust-infected barberry plants
4. Extension
    1. Distribution of new and rare seeds
    2. Distribution of foreign plants
5. Institutional Service
    1. Maintenance of departmental grounds

APPENDIX 3

PUBLICATIONS[1]

The publications of the Bureau of Plant Industry may be generally classified as technical, quasi-technical, and non-technical.

In the first class would fall the purely scientific treatises of the various experiments undertaken, together with the results obtained, written primarily for the benefit of science and disseminated through the medium of the Journal of Agricultural Research to colleges, universities, experiment stations, scientists, and others interested from a purely scientific standpoint.

In the second or quasi-technical class, would fall those publications written expressly for the benefit of the farmer and in popular form so that he may readily obtain the beneficial results of the work of the Bureau.

In the third class would fall those publications having to do with office procedure and routine office matters governing the work of the Bureau and published exclusively for the information of the Bureau personnel.

None of the divisions and offices which were brought together in the Bureau of Plant Industry have issued separate series of publications since 1901 except occasional office circulars. From 1901 to July 1, 1913, the Bureau issued its contributions through the publications of the Department of Agriculture and also through publications of its own.

Bureau Publications. The publications which the Bureau issued in its own name were Bulletins, Circulars, Office Circulars, Inventory of Seeds and Plants, and miscellaneous publications.

[1] See Check list of publications issued by the Bureau of Plant Industry 1901-1920 and by the divisions which combined to form this bureau, 1862-1901. Department of Agriculture Library, Bibliographical Collections, No. 3, January, 1921, Mimeographed.

These publications, when available, are sold by the Superintendent of Documents, Government Printing Office. Available copies of current issues are also sent out on application by the Distribution Office of the Department of Agriculture.

Bulletin. The Bulletin was the medium for publishing in limited editions the technical or semi-technical results of the investigations of the Bureau. It was a numbered series, begun in 1901 and running to No. 285 in 1913.

Circular. A series of Circulars was started in 1908 and continued to 1913. The final number was No. 132. The material was of a more popular sort than that issued through the Bulletins, and more practical in its appeal.

Miscellaneous Publications. Beginning in 1901 brief publications of ephemeral value were issued at irregular intervals. These included cultural directions to accompany seeds or plants distributed, practical instructions to farmers, miscellaneous information, and posters. Some were printed and some were mimeographed. Some were numbered and some were unnumbered. Many were issued directly by the several offices. After 1915 few were issued.

Office Circulars. From 1915 to 1919 the various offices of the Bureau issued miscellaneous and numbered circulars, describing in popular terms the results of investigations or giving practical instructions.

Inventory of Seeds and Plants Imported. Up to 1912 reports as to the seeds and plants imported by the Office of Foreign Seed and Plant Introduction were issued as Bulletins. With the discontinuation of the Bulletin series in 1913, the Inventory of Seeds and Plants was issued as an independent publication, cumulating at quarterly intervals the items already made public in the mimeographed "Plant Immigrants." This publication has continued to the present.

Service and Regulatory Announcements. Beginning in 1914 the Bureau has issued occasional Service and Regulatory Announcements concerning the limited range of regulatory activities coming within its jurisdiction.

Department Publications. During the period 1901 to 1913, when the Bureau issued its own Bulletin and Circular series, it also contributed to various departmental publications; and since July 1, 1913, its published material has been edited and distributed in the name of the Department of Agriculture, through the Division of Publications and, since July 1, 1923, through the Editorial Office of the Distribution Office.

Annual Report. The Annual Report of the Chief of the Bureau of Plant Industry is appended to the annual report of the Secretary of Agriculture in the volume of Annual Reports of the Department. It is also issued in separate form. In it is a summary statement of the progress of the investigations carried on during the year, written in popular language.

Yearbook. The Yearbook of the Department of Agriculture, first issued in 1894, constitutes the second part of the Annual Reports of the Department. In it appear reports and papers from the several bureaus, discussing in a popular manner and with illustrations the results of investigations and new developments in farm practice. To it the Bureau of Plant Industry has contributed many articles within its field. These articles are also printed separately.

Journal of Agricultural Research. In October, 1913, the Department of Agriculture established a Journal of Agricultural Research, which is issued weekly. As its name implies, it is a medium for presenting to the scientific world the technical results of investigations conducted within the various bureaus and coöperating stations. Its subscription price is $4 per annum, but it is issued free to institutions. Separates of single articles are available for general distribution.

Farmers' Bulletin. In 1889 the Farmers' Bulletin series was established for the widespread publication of the practical conclusions of the scientific operations or investigations undertaken in the Department. These bulletins are written in popular style and with a minimum of historical and technical detail. They are issued in large editions, and four-fifths of each number is made available to members of Congress, the balance being distributed by the Department. Numerous contributions of the Bureau of Plant Industry appear in this series.

Departmental Leaflets. A new series of Leaflets has been started in 1927 as a medium for the publication of popular material of the same general character as the Farmers' Bulletin series. This is designed as a practical series, with emphasis on suggestions as to remedies and methods.

Report. The Department Report was a serial publication issued from the establishment of the old Department of Agriculture to 1918. It contained miscellaneous papers and reports on agriculture,

including numerous contributions from the Bureau of Plant Industry upon sugar-beets and the beet-sugar industry.

Department Bulletin and Technical Bulletin. In July, 1913, the U. S. Department of Agriculture Bulletin was started as successor to the bulletins theretofore issued by the various bureaus. It was made up of a numbered series of contributions giving the semi-technical results of investigations which had been already issued in technical form in the strictly scientific papers of the Department. It was discontinued in 1927 with No. 1500 and replaced by a Technical Bulletin series.

Department Circulars and "Circulars." In 1919 a new series of publications was inaugurated, known as Department Circulars. These took the place of numerous circulars and miscellaneous leaflets theretofore issued by the various bureaus, and they were numbered in a single series. They were discontinued in 1927 with No. 425 and replaced by "Circulars."

Miscellaneous Circulars and Miscellaneous Publications. From 1922 to 1927 the Department issued a Miscellaneous Circular series to the number of 110. This has been succeeded by a Miscellaneous Publications series.

Circulars of the Office of the Secretary. Matters of an administrative nature are issued in the Circular of the Office of the Secretary. In former years these Circulars contained contributions on the results of investigations made by the Bureau of Plant Industry.

Official Record. Since 1922 the Department has issued a weekly periodical, The Official Record, which contains news and announcements connected with the work of the several bureaus. The subscription rate is fifty cents a year. This superseded the Weekly News Letter, which first appeared in 1913.

Bibliographical List. From time to time the Department issues free an annotated list of publications.

APPENDIX 4

FIELD STATIONS

Much of the work of the Bureau of Plant Industry is done in the field. Scattered throughout the country it has a variety of field stations, field offices, and field laboratories, which are listed below. Some of these centers are held in fee, some in trust, and others on lease, often for a nominal rental. Some are made available by other branches of the national government.

Much work is also done at coöperative stations owned by states or corporations or associations, as well as at farms owned by individuals. These are not included in the accompanying list, but they are indicated in Appendix 1.[1]

Akron, Colorado. Dry-Land Field Station.

Albuquerque, New Mexico. Forest Pathology Field Office.

Ardmore, South Dakota, Dry-Land Field Station.

Bard, California. Yuma Field Station, Office of Western Irrigation Agriculture. Also Acclimatization Garden.

Bell (Glen Dale), Maryland. Plant Introduction Garden. Fifty acres, owned by the United States. Also Horticultural Field Station.

Bellingham, Washington. Plant Introduction Garden.

Bethesda, Maryland. Citrus Detention Station, Office of Crop Physiology and Breeding. At Bureau of Animal Industry Experiment Station.

Big Spring, Texas. Dry-Land Field Station.

Biggs, California. Rice Field Station, Office of Cereal Crops and Diseases.

Brooksville, Florida. Plant Introduction Garden.

Chicago, Illinois. Markets Pathology Field Office.

Chico, California. Plant Introduction Garden. Two hundred and thirty acres, owned by the United States.

Chula Vista, California. Experiment Station, Office of Vegetable and Forage Diseases.

[1] See Directory of Field Activities, Misc. Circ. 30, issued in 1924, but still useful.

Coconut Grove, Florida. Plant Introduction Garden. Eight hundred and fifty acres, held under revocable permit from War Department.

Dalhart, Texas. Dry-Land Field Station.

East Wareham, Massachusetts. Cranberry Disease Field Laboratory.

Fallon, Nevada. Newlands Field Station, Office of Western Irrigation Agriculture.

Fort Smith, Arkansas. Sugar Plant Field Laboratory.

Fort Valley, Georgia. Peach Disease Field Laboratory.

Fresno, California. Experiment Vineyard, Office of Horticulture. Twenty acres, owned by the United States. Also Fruit Disease Field Laboratory.

Greenville, Texas. Cotton Breeding Field Station.

Hermiston, Oregon. Umatilla Field Station, Office of Western Irrigation Agriculture.

Huntley, Montana. Field Station, Office of Western Irrigation Agriculture.

Indio, California. Experiment Date Garden.

James Island, South Carolina. Cotton Breeding Field Station.

Lamanda Park, California. Horticultural Field Laboratory.

Lawton, Oklahoma. Dry-Land Field Station. One hundred and sixty acres, owned by the United States.

Los Angeles, California. Horticultural Field Office.

Madison, Wisconsin. Forest Pathology Field Office.

Mandan, North Dakota. Northern Great Plains Station, Office of Dry-Land Agriculture.

Miami, Florida. Plant Introduction Garden. Seven acres, held on lease.

Mitchell, Nebraska. Scotts Bluff Field Station, Office of Western Irrigation Agriculture.

Newell, South Dakota. Bellefourche Field Station, Office of Western Irrigation Agriculture.

Oakville, California. Experiment Vineyard.

Orlando, Florida. Citrus Disease Field Laboratory.

Palm Springs, California, Field Station, Office of Alkali and Drought-Resistant Crops. On Agua Caliente Indian Reservation.

Philema, Georgia. Pecan Field Station.

Portland, Oregon. Forest Pathology Field Office.

Providence, Rhode Island. Forest Pathology Field Office.

Riverside, California. Horticultural Field Office. Also Citrus Experiment Station.

Rosslyn, Virginia. Arlington Experiment Farm. Four hundred acres, owned by the United States.

Sacaton, Arizona. Field Station, Office of Alkali and Drought-Resistant Crops. Sixty-five acres, on Pima Indian Reservation.

Sacramento, California. Horticultural Field Office.

San Antonio, Texas. Field Station, Office of Western Irrigation Agriculture.

San Francisco, California. Forest Pathology Field Office. Also Crop Physiology Field Office.

Sanford, Florida. Truck Crop Disease Field Laboratory.

Savannah, Georgia. Plant Introduction Garden. Forty-six acres, owned by the United States.

Seaside, Oregon. Cranberry Disease Field Laboratory.

Shafter, California. Cotton Field Station.

Sheridan, Wyoming. Dry-Land Field Station.

State College, New Mexico. Cotton Breeding Field Station.

Thomasville, Georgia. Pecan Disease Field Laboratory.

Torrey Pines, California. San Diego Acclimatization Field Garden.

Tucumcari, New Mexico. Dry-Land Field Station.

Vincennes, Indiana. Fruit Disease Field Laboratory.

Wenatchee, Washington. Fruit Disease Field Laboratory.

Woodward, Oklahoma. Dry-Land Field Station.

Wooster, Ohio. Raspberry Disease Field Laboratory.

APPENDIX 5

LAWS

(A) Index to Laws

Organization

Department of Agriculture (independent establishment).....R. S., sec. 520
——(executive department).....25 Stat. L., 659
Bureau of Plant Industry (by Agricultural appropriation act of March 2, 1901).....31 Stat. L., 926

Plant and Equipment

Arlington Experimental Farm.....31 Stat. L., 135
32 Stat. L., 293
Plant Introduction stations.....39 Stat. L., 1143
41 Stat. L., 245
41 Stat. L., 730
Experiment vineyards .....41 Stat. L., 1205
Field stations .....37 Stat. L., 277
38 Stat. L., 1116
39 Stat. L., 334,1143
41 Stat. L., 245

Personnel

Officers and employees authorized.....R. S., secs. 522, 523
Eligibility to appointment to Federal Horticultural Board...37 Stat. L., 319

Powers and Duties

Secretary of Agriculture.....R. S., secs. 520, 523, 526
25 Stat. L., 659
26 Stat. L., 288
34 Stat. L., 839
Consular officers' reports on foreign agriculture and horticulture to be made available.....25 Stat. L., 186

Activities

General .....R. S,. sec. 526
44 Stat. L., 985
Collection and distribution of new and valuable seeds and plants .....R.S., secs. 520, 526, 527
Seed-testing .....R. S., sec. 522
33 Stat. L., 283
Import seed regulation.....37 Stat. L., 506
39 Stat. L., 453
44 Stat. L., 325

Appropriation

For fiscal year 1928.....44 Stat. L., 985

(B) Compilation of Laws

R. S., Sec. 520.—Establishment of the Department of Agriculture—[Act of May 15, 1862, Sec. 1; 12 Stat. L., 387]

Sec. 530. There shall be at the seat of Government a Department of Agriculture, the general design and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants.

R. S., Sec. 522—Clerks and employees—[Various acts, 1862 to 1874]

Sec. 522. There shall be in the Department of Agriculture: . . . one botanist, . . . one microscopist, . . . one superintendent of experimental gardens and grounds, . . . one assistant superintendent of experimental gardens and grounds, one superintendent of the seed-room, . . . one assistant superintendent of the seed-room. . . .

R. S., Sec. 523—Officers and employees—[Act of May 15, 1862, Sec. 4; 12 Stat. L., 387]

Sec. 523. The Commissioner [Secretary][1] of Agriculture shall appoint . . . such other employees as Congress may from time to time provide, with salaries corresponding to the salaries of similar officers in other Departments of the Government; and he shall, as Congress may from time to time provide, employ other persons for such time as their services may be needed, including chemists, entomologists, and other persons skilled in the natural sciences pertaining to agriculture.

R. S., Sec. 526—Duties of Commissioner [Secretary]—[Act of May 15, 1862, Sec. 4; 12 Stat. L., 387]

Sec. 526. That the Commissioner [Secretary][1] of Agriculture shall procure and preserve all information which he can obtain by means of books and correspondence, and by practical and scientific experiments, accurate records of which experiments shall be kept in his Office, by the collection of statistics, and by other appropriate means within his power; he shall collect new and valuable seeds and plants; shall test, by cultivation, the value of such of them as may require such tests; shall propagate such as may be worthy of propagation; and shall distribute them among agriculturists.

R. S., Sec. 527—Purchase and distribution of seeds, plants, etc. [Act of July 23, 1866, 14 Stat. L., 199, 201]

Sec. 527. The purchase and distribution of seeds by the Department of Agriculture shall be confined to such seeds as are rare and uncommon to

[1] Acts of February 9, 1889, and March 2, 1889.

the country, or such as can be made more profitable by frequent changes from one part of our country to another; and the purchase or propagation and distribution of trees, plants, shrubs, vines, and cuttings, shall be confined to such as are adapted to general cultivation and to promote the general interests of horticulture and agriculture throughout the United States.

1888—Act of June 18, 1888 (25 Stat. L., 186)—An Act To promote agriculture, and for other purposes.

That sections . . . seventeen hundred and thirteen, in chapter two, under title eighteen of the Revised Statutes of the United States, relative to consuls and commercial agents be, and they are hereby, so amended that they shall read as follows: . . .

SEC. 1713. Every consular officer . . . shall also report . . . as to the character and extent of agricultural and horticultural pursuits there.

That part of the information thus obtained which pertains to agriculture shall be transmitted . . . to the Commissioner [Secretary][2] of Agriculture, who shall include the same, or so much thereof as he may deem material and important, in his annual reports. . . .

1889—Act of February 9, 1889 (25 Stat. L., 659)—An Act To enlarge the powers and duties of the Department of Agriculture and to create an Executive Department to be known as the Department of Agriculture.

[SEC. 1]. That the Department of Agriculture,[2] shall be an Executive Department, under the supervision and control of a Secretary of Agriculture, who shall be appointed by the President, by and with the advice and consent of the Senate; and section one hundred and fifty-eight of the Revised Statutes is hereby amended to include such Department, and the provisions of title four of the Revised Statutes, including all amendments thereto, are hereby made applicable to said Department.

* * * *

SEC. 4. That all laws and parts of laws relating to the Department of Agriculture now in existence, as far as the same are applicable and not in conflict with this act, and only so far, are continued in full force and effect.

1890—Act of July 14, 1890 (26 Stat. L., 282, 288)—An Act Making appropriations for the Department of Agriculture for fiscal year ending June thirtieth, anno Domini eighteen hundred and ninety-one.

* * * *

And the Secretary [of Agriculture] is hereby authorized and directed to perform all the duties named in . . . all other acts of Congress in force on February eighth, eighteen hundred and eighty-nine, to be performed by the Commissioner of Agriculture.

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[2]Acts February 9, 1889, and March 2, 1889.

1900—Act of April 18, 1900 (31 Stat. L., 135)—An Act To set apart a portion of the Arlington estate for experimental agricultural purposes, and to place said portion under the jurisdiction of the Secretary of Agriculture and his successors in office.[3]

[SEC. 1]. That the jurisdiction is hereby transferred and given to the Secretary of Agriculture and his successors in office over so much of the Government land in Alexandria County, Virginia, known as the Arlington estate, as lies east of the public road leading from the Aqueduct Bridge to Alexandria, Virginia, otherwise called the Georgetown and Alexandria road, and between said road and the Potomac River, containing about four hundred acres, with the exception, however, of a strip of land as follows, commencing at the point where the Georgetown and Alexandria road enters the Arlington estate on the north side, thence along said road six hundred and twenty-five yards, thence in a line perpendicular to said road to the Chesapeake and Ohio Canal, thence along said canal to the south line of the reservation jurisdiction over which is retained by the Secretary of War.

SEC. 2. That the declared purpose of this Act is to set apart said tract of land as a general experimental farm in its broadest sense, where all that pertains to agriculture in its several different branches, including animal industry and horticulture, may be fostered and encouraged, and the practice and science of farming in the United States advanced, promoted, and practically illustrated.

SEC. 3. That the Secretary of Agriculture will take immediate and absolute control of said property described in section one, and by clearing, underdraining, grassing, laying out proper roads and driveways, constructing proper bridges and buildings, and in other ways as his judgment may dictate brings said property as rapidly as possible into the proper condition to answer the purposes for which it is set apart: *Provided,* That all improvements of or which may at any time be made upon said premises, as herein contemplated, shall be so located, constructed, and maintained as not to interfere with or obstruct the natural waterways or the sewers or other means now established or which may hereafter be provided, constructed, or maintained for the purposes of affording proper drainage and sewerage to the other portions of said estate: *And provided further,* That this Act shall not impair or interfere with any of the rights heretofore granted by Act of Congress to the Washington, Alexandria and Mount Vernon Railway Company to construct, maintain, and operate its electric railroad across the said portion of the estate lying east of said public road.

SEC. 4. That in the development, improvement, and management of said property full discretion is hereby given the Secretary of Agriculture and his successors in office to carry into effect the declared purposes of this Act.

SEC. 5. That this Act shall be in force from its passage.

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[3] See also acts of June 3, 1902 (32 Stat. L., 286, 303), and March 3, 1903 (32 Stat. L., 1147, 1155).

1902—Act of June 3, 1902 (32 Stat. L., 286, 293, 303)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and three.

* * * *

. . . "An Act to set apart a portion of the Arlington estate for experimental agricultural purposes, and to place said portion under the jurisdiction of the Secretary of Agriculture and his successors in office" . . . shall be construed to confer upon the Secretary of Agriculture and his successor jurisdiction over so much of the Government land in Alexandria County, Virginia, known as the Arlington estate, as lies east of the public road leading from the Aqueduct Bridge to Alexandria, Virginia, otherwise called the Georgetown and Alexandria road, and between said road and the Potomac River, containing about four hundred acres, with the exception, however, of a strip of land as follows: Commencing at the point where the Georgetown and Alexandria estate on the north side, thence along said road six hundred and twenty-five yards, thence in a line perpendicular to said road on the Chesapeake and Ohio Canal, thence along said canal to the north line of the reservation. . . .[4]

* * * *

That all existing statutes relating to . . . the Division of Botany, the Division of Pomology, the Division of Vegetable Physiology and Pathology, the Division of Agrostology and Experimental Gardens and Grounds, reorganized into the Bureau of Plant Industry, not otherwise repealed, shall remain in effect as applying to the respective bureaus into which the divisions named have been reorganized. . . .

1904—Act of April 23, 1904 (33 Stat. L., 276, 283)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and five.

* * * *

The Secretary of Agriculture is hereby directed to obtain in the open market, sample of seeds of grass, clover, or alfalfa, test the same, and if any such seeds are found to be adulterated or misbranded, or any seeds of Canada blue grass (Poa compressa) are obtained under any other name than Canada blue grass or Poa compressa, to publish the results of the tests, together with the names of the persons by whom the seeds were offered for sale. . . . [Repeated in the appropriation acts for the fiscal years 1906 to 1909, inclusive, and substantially repeated in succeeding appropriation acts.]

1906—Joint Resolution of June 30, 1906 (34 Stat. L., 839)—Joint Resolution Relative to the printing of twelve thousand copies of the report on the progress of the beet-sugar industry.

[4] Repeated in the appropriation act for the fiscal year 1904.

. . . that the Secretary of Agriculture be authorized to print and distribute annually hereafter eight thousand copies of such annual reports covering the progress of the beet-sugar industry: *Provided,* That the preparation and publication of such annual reports shall be within the discretion of the Secretary of Agriculture.

1908—Act of May 23, 1908 (35 Stat. L., 251, 259)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and nine.

* * * *

. . . hereafter officials of the Forest Service designated by the Secretary of Agriculture shall, . . . aid in the other Federal Bureaus and Departments on request from them, in the performance of the duties imposed on them by law; . . .

1912—Act of August 10, 1912 (37 Stat. L., 269, 277)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and thirteen.

* * * *

. . . That the sum of fifty thousand dollars . . . , or so much thereof as may be necessary, shall be used for the purchase of land and equipment and the construction of buildings necessary to establish, equip, and maintain an experimental farm in the northern section of the Great Plains area [Mandan, North Dakota] to demonstrate the kind and character of plants, shrubs, trees, berries, and vegetables best adapted to the climate and soil of the semiarid lands of the United States. . . .

1912—August 20, 1912 (37 Stat. L., 315, 319)—An Act to regulate the importation of nursery stock and other plants and plant products; to enable the Secretary of Agriculture to establish and maintain quarantine districts for plant diseases and insect pests; to permit and regulate the movement of fruits, plants, and vegetables therefrom, and for other purposes.

* * * *

Sec. 12. That for the purpose of carrying out the provisions of this Act there shall be appointed by the Secretary of Agriculture from existing bureaus and offices in the Department of Agriculture, including the Bureau of Entomology, the Bureau of Plant Industry, and the Forest Service, a Federal Horticultural Board consisting of five members, of whom not more than two shall be appointed from any one bureau or office, and who shall serve without additional compensation.

1912—Act of August 24, 1912 (37 Stat. L., 506)—An Act To regulate foreign commerce by prohibiting the admission into the United States of certain adulterated grain and seeds unfit for seeding purposes, as amended April 26, 1926 (44 Stat. L., 325).[5]

[Sec. 1.] That from and after six months after the passage of this Act the importation into the United States of seeds of alfalfa, barley, Canadian blue grass, Kentucky blue grass, awnless brome grass, buckwheat, clover, field corn, Kafir corn, meadow rescue, flax, millet, oats, orchard grass, rape, rye, sorghum, timothy, and wheat, or mixtures of seeds containing any of such seeds as one of the principal component parts, which are adulterated or unfit for seeding purposes under the terms of this Act, is hereby prohibited; and the Secretary of the Treasury and the Secretary of Agriculture shall, jointly or severally, make such rules and regulations as will prevent the importation of such seeds into the United States: *Provided, however,* That such seed may be delivered to the owner or consignee thereof under bond, to be recleaned in accordance with and subject to such regulations as the Secretary of the Treasury may prescribe, and when cleaned to the standard of purity specified in this Act for admission into the United States such seeds may be released to the owner or consignee thereof after the screenings and other refuse removed from such seed shall have been disposed of in a manner prescribed by the Secretary of Agriculture: *Provided further,* That this Act shall not apply to the importation of barley, buckwheat, field corn, Kafir corn, sorghum, flax [*broomcorn millet, early fortune millet*],[6] oats, rye, or wheat not intended for seeding purposes, when shipped in bond through the United States or imported for the purpose of manufacture, but such shipment shall be subject to provisions of the [Tariff] Act of August fifth, nineteen hundred and nine.

Sec. 2. That seed shall be considered adulterated within the meaning of this Act—

First. When seed of red clover contains more than three per centum by weight of seed of yellow trefoil, or any other seed of similar appearance to and of lower market value than seed of red clover.

Second. When seed of alfalfa contains more than three per centum by weight of seed of yellow trefoil, burr clover, and sweet clover, singly or combined.

Third. When any kind or variety of seeds, or any mixture described in section one of this Act, contains more than five per centum by weight of seed of another kind or variety of lower market value and of similar appearance: *Provided,* That the mixture of the seed of white and alsike clover, red and alsike clover, or alsike clover and timothy, shall not be deemed an adulteration under this section.

Sec. 3. That seed shall be considered unfit for seeding purposes within the meaning of this Act—

First. When any kind or variety of clover or alfalfa seed contains more than one seed of dodder to five grams of clover or alfalfa seed, respectively.

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[5] See also act of August 11, 1916.

[6] Italicised as amended.

Second. When any kind or variety of the seeds or any mixture described in section one of this Act contains more than three per centum by weight of seeds of weeds.

SEC. 4. That any person or persons who shall knowingly violate the provisions of this Act, shall be deemed guilty of a misdemeanor and shall pay a fine of not exceeding five hundred dollars and not less than two hundred dollars: *Provided,* That any person or persons who shall knowingly sell for seeding purposes seeds or grain which were imported under the provisions of this Act for the purpose of manufacture shall be deemed guilty of a violation of this Act.

SEC. 5.[7] (a) On and after the effective date of this subdivision the importation into the United States of seeds of alfalfa or red clover, or any mixture of seed containing 10 per centum or more of the seeds of alfalfa and/or red clover, is prohibited unless such seeds are colored in such manner and to such extent as the Secretary of Agriculture may prescribe and, when practicable, the color used shall indicate the country or region of origin.

(b) Whenever the Secretary of Agriculture, after public hearing, determines that seeds of alfalfa or red clover from any foreign country or region are not adapted for general agricultural use in the United States he shall publish such determination. On and after the expiration of ninety days after the date of such publication and until such determination is revoked the importation into the United States of any such seeds, or of any mixture of seeds containing 10 per centum or more of such seeds of alfalfa and/or red clover, is prohibited, unless at least 10 per centum of the seeds in each container is stained a red color, in accordance with such regulations as the Secretary of Agriculture may prescribe.

(c) The Secretary of the Treasury and the Secretary of Agriculture shall jointly prescribe such rules and regulations as may be necessary to prevent the importation into the United States of any seeds the importation of which is prohibited.

(d) Subdivision (a) of this section shall become effective upon the expiration of thirty days after the date of the passage of this amendatory Act.

SEC. 6.[7] (a) No person shall transport, deliver for transportation, sell, or offer for sale, in interstate commerce, any seed which is misbranded within the meaning of this section; except that this section shall not apply to any common carrier in respect of any seed transported or delivered for transportation in the ordinary course of its business as a common carrier.

(b) Any misbranded seed shall be liable to be proceeded against in the district court of the United States for any judicial district in which it is found, and to be seized for confiscation by a process of libel for condemnation, if such seed is being—

(1) Transported in interstate commerce; or

(2) Held for sale or exchange after having been so transported.

(c) If such seed is condemned by the court as misbranded, it shall be disposed of in the discretion of the court—

(1) By sale; or

(2) By delivery to the owner thereof upon the payment of the legal costs and charges, and the execution and delivery of a good and sufficient bond to the effect that such seed will not be sold or disposed of in any jurisdiction contrary to the provisions of this Act or the laws of such jurisdiction; or

[7] New sections added by the amendatory act.

(3) By destruction.

(d) If such seed is disposed of by sale, the proceeds of the sale, less the legal costs and charges, shall be paid in to the Treasury as miscellaneous receipts.

(e) Proceedings in such libel cases shall conform, as nearly as may be, to suits *in rem* in admiralty, except that either party may demand trial by jury on any issue of fact if the value in controversy exceeds $20; and facts so tried shall not be reexamined other than in accordance with the rules of the common law. All such proceedings shall be at the suit and in the name of the United States. The Supreme Court of the United States and, under its direction, other courts of the United States are authorized to prescribe rules regulating such proceedings in any particular not provided by law.

(f) As used in this section—

(1) The term "person" means individual, partnership, corporation, or association;

(2) The term "interstate commerce" means commerce between any State, Territory or possession, or the District of Columbia, and any other State, Territory, or possession, or the District of Columbia; or between points within the same State, Territory, or possession, or the District of Columbia, but through any place outside thereof; or within any Territory or possession, or the District of Columbia; and

(3) The term "district court of the United States" includes any court exercising the powers of a district court of the United States.

(g) For the purposes of this section, seed shall be held to be misbranded if—

(1) The container thereof, or the invoice relating thereto, or any advertising pertaining thereto, bears or contains any statement, design, or device that is false or fraudulent; or

(2) If such seed is required to be colored, under the provisions of section 5 and the regulations issued thereunder, and is not so colored; or

(3) If such seed is colored in imitation of seed required to be colored under the provisions of section 5 and the regulations issued thereunder.

(h) The Secretary of Agriculture is authorized to prescribe such regulations as may be necessary for carrying out the provisions of this section.

(i) This section shall take effect upon the date of the passage of this amendatory Act; but no penalty or condemnation shall be enforced for any violation of this section occurring within thirty days after such date.

1915—Act of March 4, 1915 (38 Stat. L., 1086, 1116)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and sixteen.

* * * *

The north half of the south half of section nineteen, township two north, range eleven west, Indian meridian [Lawton], Oklahoma, formerly a part of the Kiowa, Comanche, and Apache Indian Reservation is hereby set aside for use of the Department of Agriculture for a dry farming or subhumid station; and the sum of $200 is hereby appropriated to pay the Indians therefor. . . .

1916—Act of July 3, 1916 (39 Stat. L., 344)—An Act To authorize an exchange of lands with the State of North Dakota for promotion of experiments in dry-land agriculture, and for other purposes.

[SEC. 1]. That upon receipt of a proper deed from the State of North Dakota, executed under authority of the Act of its legislative assembly, approved February fifth, nineteen hundred and fifteen, reconveying to the United States title to section sixteen, township one hundred and thirty-eight north, range eighty-one west, fifth principal meridian, the Secretary of the Interior is authorized to issue patents to said State for such vacant, surveyed, unreserved, unoccupied, nonmineral public lands as may be selected by said State within its boundaries, not exceeding one thousand two hundred and eighty acres in aggregate area, and said section when so reconveyed shall not be subject to settlement, location, entry, or selection under the public land laws, but shall be reserved for the use of the Department of Agriculture in carrying on experiments in dry-land agriculture at the Northern Great Plains Field Station, Mandan, North Dakota.

1916—Act of August 11, 1916 (39 Stat. L., 446, 453)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and seventeen.

* * * *

Hereafter the provisions of the said Act of August twenty-fourth, nineteen hundred and twelve [37 Stat. L., 506], shall be applied to seed of vetch and ryegrass; and, hereafter, when any kind or variety or miture of the seeds subject to the provisions of said Act of August twenty-fourth, nineteen hundred and twelve, as hereby amended shall contain less than sixty-five per centum of live pure seed as distinguished from dead seed, chaff, dirt, other seeds, or foreign matter, such seeds or mixtures thereof shall be deemed unfit for seeding purposes within the meaning of said Act approved August twenty-fourth, nineteen hundred and twelve, and the importation of such seed or mixture thereof is prohibited: *Provided, however,* That seed of Kentucky blue grass and seed of Canada blue grass shall not be considered unfit for seeding purposes when they contain fifty per centum or more of live pure seed: . . .

1917—Act of March 4, 1917 (39 Stat. L., 1134, 1143)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and eighteen.

* * * *

BUREAU OF PLANT INDUSTRY

* * * *

For the purchase, preparation, and irrigation of not to exceed one hundred and fifty acres of land at Chico, Butte County, California, $35,000; . . .

1919—Act of July 24, 1919 (41 Stat. L., 234, 245)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1920.

* * * *

BUREAU OF PLANT INDUSTRY

* * * *

. . . the Secretary of Agriculture is authorized to expend $50,000, or so much thereof as may be necessary, for the purchase of not to exceed fifty acres of suitable land near the city of Washington, in the District of Columbia [Bell or Glen Dale, Maryland] and for the erection thereon of all necessary buildings and equipment, and for the establishment of a plant inspection and detention station: *Provided,* That not to exceed $10,000 of this sum shall be expended for the purchase of the land: *Provided further.* The limitation in this Act as to cost of farm buildings shall not apply to this paragraph; . . .

1920—Act of May 31, 1920 (41 Stat. L., 695, 730)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1921.

* * * *

The Secretary of Agriculture is authorized to acquire by gift, devise, or by purchase in fee simple for a sum not to exceed $1 for each site, the sites now occupied by field stations at Chico, California, consisting of eighty acres and used for propagating, testing, and distributing new plant introductions; the site at Bellingham, Washington, consisting of about 60 acres and used as a bulb station and for propagating, testing, and distributing new crop plants; and the sites at Buena Vista, Florida, and Savannah, Georgia, consisting of about twenty-five acres and about forty-six acres respectively, and used for propagating, testing, and distributing new crop plants peculiarly adapted to the warmer parts of the United States.

1921—Act of March 2, 1921 (41 Stat. L., 1205)—An Act For the purchase of land occupied by experiment vineyards near Fresno and Oakville, California.

That the Secretary of Agriculture be, and he is hereby, authorized to purchase and acquire the lands occupied by the department's experiment vineyards near Fresno and Oakville, California, now maintained under contracts with the owners of said lands: *Provided,* That the land purchased for the Fresno vineyards shall not exceed twenty acres at a cost not to exceed $12,000 and for the Oakville vineyard not to exceed twenty acres at a cost not to exceed $15,000.

1925—Act of March 4, 1925 (43 Stat. L., 1313, 1325)—An Act Making appropriations to supply deficiencies in certain appropriations for the fiscal year ending June 30, 1925, and prior fiscal years, to provide supplemental appropria-

tions for the fiscal years ending June 30, 1925, and June 30, 1926, and for other purposes.

* * * *

. . . That . . . not to exceed $16,000 may be used for the purchase of land and the construction thereon of necessary farm buildings at Canal Point, Florida.

1927—Act of January 18, 1927 (44 Stat. L., 976, 985, 1003)—An Act Making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1928, and for other purposes.

BUREAU OF PLANT INDUSTRY

SALARIES AND GENERAL EXPENSES

For all necessary expenses in the investigation of fruits, fruit trees, grain, cotton, tobacco, vegetables, grasses, forage, drug, medicinal, poisonous, fiber, and other plants and plant industries, in cooperation with other branches of the department, the State experiment stations, and practical farmers, and for the erection of necessary farm buildings; *Provided,* That the cost of any building erected shall not exceed $1,500; for field and station expenses, including fences, drains, and other farm improvements; for repairs in the District of Columbia and elsewhere; for rent outside of the District of Columbia; and for the employment of all investigators, local and special agents; agricultural explorers, experts, clerks, illustrators, assistants, and all labor and other necessary expenses in the city of Washington and elsewhere required for the investigations, experiments, and demonstrations herein authorized, as follows:

For necessary expenses for general administrative purposes, including the salary of chief of bureau and other personal services in the District of Columbia, $193,120.

For investigations of plant diseases and pathological collections, including the maintenance of a plant-disease survey, $108,440.

For the investigations of diseases of orchard and other fruits, including the diseases of the pecan, $142,705.

For conducting such investigations of the nature and means of communication of the disease of citrus trees known as citrus canker, and for applying such methods of eradication or control of the disease as in the judgment of the Secretary of Agriculture may be necessary, including the payment of such expenses and the employment of such persons and means, in the city of Washington and elsewhere, and cooperation with such authorities of the States concerned, organizations of growers, or individuals, as he may deem necessary to accomplish such purposes $45,000, and, in the discretion of the Secretary of Agriculture, no expenditures shall be made for these purposes until a sum or sums at least equal to such expenditures shall have been appropriated, subscribed, or contributed by State, county, or local authorities or by individuals or organizations for the accomplishment of such purposes: *Provided,* That no part of the money herein appropriated shall be used to pay the cost or value of trees or other property injured or destroyed.

For the investigation of diseases of forest and ornamental trees and shrubs, including a study of the nature and habits of the parasitic fungi causing the chestnut-tree bark disease, the white-pine blister rust, and other epidemic tree diseases, for the purpose of discovering new methods or control and applying methods of eradication or control already discovered, $140,000, of which sum not more than $10,000 may be expended for the employment of pathologists in connection with forest experiment stations.

For applying such methods of eradication or control of the white-pine blister rust as in the judgment of the Secretary of Agriculture may be necessary, including the payment of such expenses and the employment of such persons and means in the city of Washington and elsewhere, in cooperation with such authorities of the States concerned, organizations, or individuals as he may deem necessary to accomplish such purposes, and in the discretion of the Secretary of Agriculture no expenditures shall be made for these purposes until a sum or sums at least equal to such expenditures shall have been appropriated, subscribed, or contributed by States, county, or local authorities, or by individuals or organizations for the accomplishment of such purposes, $471,520: *Provided,* That no part of the money herein appropriated shall be used to pay the cost or value of trees or other property injured or destroyed.

For the investigation of diseases of cotton, potatoes, truck crops, forage crops, drug and related plants, $167,570; of which $7,500 shall be immediately available for investigations relating to the root-rot of cotton.

For investigating the physiology of crop plants and for testing and breeding varieties thereof, $80,160.

For plant-nutrition investigation, $16,780.

For acclimatization and adaptation investigations of cotton, corn, and other crops introduced from tropical regions, and for the improvement of cotton and other fiber plants by cultural methods, breeding, and selection, and for determining the feasibility of increasing the production of hard fibers outside of the continental United States, $200,800; *Provided,* That not more than $7,500 of this sum may be used for experiments in cottonseed interbreeding; *Provided further,* That of this sum $50,000 may be used for explorations, research, and field experiments relating to potential rubber-producing plants.

For the investigation, testing, and improvement of plants yielding drugs, spices, poisons, oils, and related products and by-products, and for general physiological and fermentation investigations, $58,200.

For crop technological investigations, including the study of plant infesting nematodes, $54,340.

For studying and testing commercial seeds, including the testing of samples of seeds of grasses, clover, or alfalfa, and lawn-grass seeds secured in the open market, and where such samples are found to be adulterated or misbranded the results of the tests shall be published together with the names of the persons by whom the seeds were offered for sale, and for carrying out the provisions of the Act approved August 24, 1912, entitled "An Act to regulate foreign commerce by prohibiting the admission into the United States of certain adulterated grain and seeds unfit for seeding purposes" (Thirty-seventh Statutes at Large, page 506), $64,538: *Provided,* That not to exceed $250 of this amount may be used for meeting the share of the United States in the expenses of the International Seed Testing Congress in carrying out plans for correlating the work of the various

adhering governments on problems relating to seed analysis or other subjects which the Congress may determine to be necessary in the interest of international seed trade.

For the investigation and improvement of cereals and methods of cereal production, and the study of cereal diseases, and for the investigation of the cultivation and breeding of flax for seed purposes, including a study of flax diseases, and for the investigation and improvement of broom corn and methods of broom corn production, $737,200; *Provided,* That $375,000 shall be set aside for the location of and destruction of the barberry bushes and other vegetation from which such rust spores originate; *Provided further,* That $65,000 of this amount shall be available for expenditure only when an equal amount shall have been appropriated, subscribed, or contributed by States, counties, or local authorities, or by individuals or organizations, for the accomplishment of such purposes.

For the investigation and improvement of tobacco and the methods of tobacco production and handling, $58,740.

For the breeding and physiological study of alkali-resistant and drought-resistant crops, $23,920.

For sugar-plant investigations, including studies of diseases and the improvement of sugar beets and sugar-beet seed, $171,255.

For investigation, improvement, and utilization of wild plants and grazing lands, and for determining the distribution of weeds and means of their control, $45,380.

For the investigation and improvement of methods of crop production under subhumid, semiarid, or dry-land conditions, $208,050: *Provided,* That the limitations in this act as to the cost of farm buildings shall not apply to this paragraph: *Provided further,* that no part of this appropriation shall be used in the free distribution, or propagation for free distribution, of cuttings, seedlings, or trees of willow box elder, ash, caragana, or other common varieties of fruit, ornamental, or shelter-belt trees in the Northern Great Plains area, except for experimental or demonstration purposes in the States of North and South Dakota west of the one hundredth meridian, and in Montana and Wyoming east of the five thousand-foot contour lines; *Provided further,* That no part of this appropriation shall be used for the establishment of any new field station.

For investigations in connection with western irrigation agriculture, the utilization of lands reclaimed under the Reclamation Act, and other areas in the arid and semiarid regions, $109,095.

For the investigation, improvement, encouragement, and determination of the adaptability to different soils and climatic conditions of pecans, almonds, Persian walnuts, black walnuts, hickory nuts, butternuts, chestnuts, filberts, and other nuts, and for methods of growing, harvesting, packing, shipping, storing, and utilizing the same, $29,040.

For the investigation and improvement of fruits, and the method of fruit growing, harvesting, and, in cooperation with the Bureau of Markets and Crop Estimates, studies of the behavior of fruits during the processes of marketing and while in commercial storage, $197,660.

To cultivate and care for the gardens and grounds of the Department of Agriculture in the city of Washington, including the keep and lighting of the grounds and the construction, surfacing, and repairing of roadways and walks; and to erect, manage, and maintain conservatories, greenhouses,

and plant and fruit propagation houses on the grounds of the Department of Agriculture in the city of Washington, $89,500.

For horticultural investigations, including the study of producing and harvesting truck and related crops, including potatoes, and, in cooperation with the Bureau of Markets and Crop Estimates, studies of the behavior of vegetables while in the processes of marketing and in commercial storage, and the study of landscape and vegetable gardening, floriculture, and related subjects, $115,000.

For investigating, in cooperation with States or privately owned nurseries, methods of propagating fruit trees, ornamental and other plants, the study of stocks used in propagating such plants and methods of growing stocks, for the purpose of providing American sources of stocks, cuttings, or other propagating materials, $21,800.

For continuing the necessary improvements to establish and maintain a general experiment farm and agricultural station on the Arlington estate, in the State of Virginia, in accordance with the provisions of the Act of Congress approved April 18, 1900, $57,000: *Provided,* That the limitations in this Act as to the cost of farm buildings shall not apply to this paragraph.

For investigations in foreign seed and plant introduction, including the study, collection, purchase, testing, propagation, and distribution of rare and valuable seeds, bulbs, trees, shrubs, vines, cuttings, and plants from foreign countries and from our possessions, and for experiments with reference to their introduction and cultivation in this country, $182,300.

For the purchase, propagation, testing, and distribution of new and rare seeds; for the investigation and improvement of grasses, alfalfa, clover, and other forage crops; including the investigation of the utilization of cacti and other dry-land plants, $120,500.

For biophysical investigations in connection with the various lines of work herein authorized, $35,812.

Total for Bureau of Plant Industry, $3,945,425, of which amount not to exceed $1,393,800 may be expended for personal services in the District of Columbia.

Interchange of Appropriations

Not to exceed 10 per centum of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditures on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per centum shall be added to any one item of appropriation, except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

APPENDIX 6

FINANCIAL STATEMENTS

Explanatory Note

Statements showing appropriations, receipts, expenditures, and other financial data for a series of years constitute the most effective single means of exhibiting the growth and development of a service. Due to the fact that Congress has adopted no uniform plan of appropriations for the several services and that the latter employ no uniform plan in respect to the recording and reporting of their receipts and expenditures, it is impossible to present data of this character according to any standard scheme of presentation. In the case of some services the administrative reports contain tables showing financial conditions and operations of the service in considerable detail; in others financial data are almost wholly lacking. Careful study has in all cases been made of such data as are available, and the effort has been made to present the results in such a form as will exhibit the financial operations of the services in the most effective way that circumstances permit.

BUREAU OF PLANT INDUSTRY

Appropriations for Plant Industry Projects, Fiscal Years 1895 and 1900 and 1902 and 1905

	Constituent divisions and services		Bureau of Plant Industry	
	1895	1900	1902	1905
Seed Purchase and Distribution	$135,400	$110,000	$250,000	$250,000
Foreign Seed and Plant Introduction	.....	20,000	20,000	40,000
Botanical Investigations	30,000	20,000	45,000	67,500
Pomological Investigations	5,000	9,500	20,000	43,500
Forage Plant Investigations	.....	12,000	[a]20,000	42,500
Sugar Investigations	10,000	7,000	5,000	7,500
Tea Investigations	.....	1,000	[b]7,000	10,000
Fiber Investigations	5,000	.....	.....	.....
Pathological and Physiological Investigations	20,000	26,000	60,000	[c]150,000
Experimental Gardens and Grounds	29,500	28,000	20,000	25,000
Museum	3,000	1,500	.....	.....
Greenhouse Removal and Reconstruction	.....	.....	.....	[d]25,000
Arlington Experimental Farm	.....	.....	10,000	20,000
Salaries	38,020	33,400	39,680	63,430
Totals	$275,920	$268,400	$496,680	$744,430

[a] $5,000 available in 1901.
[b] $2,000 available in 1901.
[c] $2,000 available in 1904.
[d] Available in 1904.

APPROPRIATIONS, BY TWO-YEAR INTERVALS, FISCAL YEARS 1910 TO 1924, INCLUSIVE

Appropriations	1910	1912	1914	1916	1918	1920	1922	1924
Soil Fertility Investigations	.....	.....	.....	$32,700	$36,260	$35,060	$45,060	$45,060
Soil Bacteriology and Plant Nutrition Investigations	$25,070	[a] $26,145	$30,000	42,000	39,300	39,060	50,000	50,000
Seed Purchase and Distribution	262,320	289,680	296,000	252,540	243,720	358,980	360,000	.....
New and Rare Seed Distribution	11,550	13,110	[b]	60,000	60,000	57,800	48,622	36,600
Seed Testing and Seed Importation Act Enforcement	25,840	26,650	26,000	28,700	34,700	36,680	41,680	44,680
Foreign Seed and Plant Introduction	59,840	11,260	[b] 83,000	70,400	[c] 128,040	[d] 132,700	125,000	125,000
Crop Physiology and Plant Breeding Investigations	[e] 42,130	33,015	33,380	44,540	49,060	48,460	56,860	66,860
Pomological Investigations	71,360	87,735	92,000	105,060	[f] 107,200	83,200	83,200	131,700
Nut Culture Investigations	.....	.....	.....	.....	[f]	20,000	20,000	28,000
Nursery Stock Investigations	.....	.....	.....	.....	.....	.....	20,000	20,000
Alkali and Drought Resistant Plant Investigations	17,550	18,140	19,280	22,280	24,280	24,280	20,080	20,080
Crop Acclimatization and Fiber Plant Investigations	36,120	34,670	38,000	37,580	82,510	104,410	120,000	132,500
Cereal Investigations (Including Barberry Eradication)	63,910	77,925	104,925	142,005	186,505	452,505	379,705	[g] 697,505
Forage Crop Investigations	10,000	20,000	25,000	59,920	83,180	81,980	76,378	78,400
Horticultural Investigations	[h]	[h]	50,960	56,080	62,740	73,340	71,940	79,440
Drug and Related Plant and General Physiological Investigations	43,420	46,930	50,000	48,820	58,820	58,820	39,820	39,820
Sugar Plant Investigations (Including Diseases)	24,300	32,355	38,595	41,495	56,015	94,115	94,115	104,115
Tobacco Investigations	23,180	26,630	31,630	25,000	32,000	32,000	41,000	41,000
Dry Land Agriculture Investigations	31,760	70,000	130,000	160,000	160,000	159,000	169,000	180,000
Western Irrigation Agriculture Investigations	76,680	73,060	75,000	70,380	75,380	73,580	94,420	94,420
Demonstrations on Reclamation Projects	.....	.....	.....	40,000	50,000	48,600	30,000	39,000

Investigations in Economic and Systematic Botany	18,250	21,930	22,000	24,000	23,100	22,200	27,200	30,800
Cotton Standards Investigations	12,250	32,350	46,120	.....	.....	.....	.....	.....
Grain Standards Investigations	52,440	57,080	65,000	72,920	.....	.....	.....	.....
Farm Management Investigations	133,000	142,920	375,000	.....	.....	.....	.....	.....
Logged-Off Land Investigations	.....	.....	5,000	.....	.....	.....	.....	.....
Farm Demonstrations in Cotton Belt	225,000	350,000	375,000	.....	.....	.....	.....	.....
Crop Technology Investigations	13,030	10,610	10,010	19,770	24,940	24,940	24,940	42,440
Paper Plant Investigations	10,000	8,000	10,840	10,840	16,760	.....	.....	.....
Biophysical Investigations	15,510	16,375	20,000	25,000	32,500	32,500	32,500	32,500
Plant Disease Investigations; Pathological Collections; Plant Disease Survey Pathological Laboratory)	22,470	22,930	30,000	34,500	62,500	62,020	72,000	77,000
Fruit Disease Investigations	34,700	42,075	40,675	56,115	76,415	80,935	80,935	113,935
Citrus Canker Investigations	.....	.....	.....	300,000	430,000	196,320	79,720	60,000
Cereal Disease Investigations	.....	.....	.....	.....	.....	50,000	30,000	[g]
Investigations of Diseases of Cotton, Potatoes, Truck Crops, Forage Crops, Drug and Related Plants	13,060	24,860	25,000	56,000	87,800	87,800	100,000	127,000
Investigations in Forest Pathology	17,340	24,670	[i] 99,510	57,175	85,915	82,315	81,115	81,115
White Pine Blister Rust Investigations	.....	.....	.....	20,000	300,000	220,728	250,000	250,000
Experimental Gardens and Grounds	19,230	13,860	11,690	11,690	11,690	11,690	15,000	15,000
Arlington Experiment Farm	[h] 38,470	[h] 38,000	15,000	15,000	21,900	21,900	20,500	20,500
General Administrative Expenses	48,976	38,251	35,690	32,490	31,020	29,040	25,980	25,980
Salaries	210,510	330,470	427,690	424,150	419,380	491,280	501,000	485,020
	.....	.....	.....	.....	56,726	.....	.....	.....
Totals	$1,709,266	$2,061,686	$2,737,995	$2,499,150	$3,250,356	$3,428,238	$3,327,770	$3,415,470

[a] Includes Water Purification Investigations.
[b] New and Rare Seed Distribution included under Foreign Seed and Plant Introduction.
[c] Includes $35,000 for land for plant introduction station at Chico, Cal.
[d] Includes $50,000 for land, buildings, and equipment for plant detention station at Glen Dale (Bell), Md.
[e] Includes $14,840 for General Plant Breeding and Coöperative Demonstrations.
[f] Nut Culture Investigations, $9000, included under Pomological Investigations.
[g] Cereal Disease Investigations included under Cereal Investigations after 1923.
[h] Horticultural Investigations included under Arlington Experiment Farm.
[i] Includes $70,000 for Chestnut Bark Disease Investigations.

APPROPRIATIONS AND EXPENDITURES, FISCAL YEARS 1925 TO 1928, INCLUSIVE

Appropriation	1925		1926		1927		1928	
	Appropriation	Expenditure	Appropriation	[a] Expenditure	Appropriation	[a] Expenditure	Appropriation	Expenditure
Soil Fertility Investigations	$49,040	$48,670.38	$49,040	$47,419.64	$61,500	$60,278.12	[b]	
Soil Bacteriology and Plant Nutrition Investigations	52,990	51,707.64	52,235	50,242.56	50,720	49,064.72	$16,780	
Seed Purchase and Distribution	.....	.....	.....	.....	.....	.....	.....	
New and Rare Seed Distribution	37,140	35,574.28	36,600	36,295.43	[c]	.....	[c]	
Seed Testing and Seed Importation Act Enforcement	58,230	55,060.74	58,230	54,315.00	56,298	53,887.72	64,538	
Foreign Seed and Plant Introduction	138,620	137,742.83	144,989	144,306.80	146,000	145,989.86	182,300	
Crop Physiology and Plant Breeding Investigations	72,582	69,921.79	72,582	70,168.50	71,000	70,102.92	80,160	
Pomological Investigations	142,325	139,005.31	154,825	147,304.39	164,000	158,747.81	197,660	
Nut Culture Investigations	27,800	26,170.05	27,300	26,561.54	27,300	25,561.62	29,040	
Nursery Stock Investigations	20,164	19,686.80	20,164	19,705.29	20,000	19,099.68	21,800	
Alkali and Drought Resistant Plant Investigations	22,483	21,779.78	22,483	21,575.48	22,193	20,936.19	23,920	
Crop Acclimatization and Fiber Plant Investigations	[d] 228,658	[e] 222,870.22	[f] 197,658	193,439.74	[f] 193,920	190,108.01	200,800	
Cereal Investigations (Including Barberry Eradication)	699,340	684,277.15	699,340	685,620.13	697,340	682,310.72	737,200	
Forage Crop Investigations	92,360	89,761.19	91,365	90,374.02	98,000	97,446.02	120,500	
Horticultural Investigations	88,542	86,679.01	88,542	85,901.75	88,000	86,002.71	115,000	
Drug and Related Plant and General Physiological Investigations	41,992	36,854.42	46,992	39,695.50	46,412	38,795.37	58,200	
Sugar Plant Investigations (Including Diseases)	125,695	120,247.68	140,695	127,252.31	155,695	137,618.55	171,255	
Tobacco Investigations	50,220	48,648.74	50,220	48,912.28	53,220	51,599.86	58,740	
Dry Land Agriculture Investigations	199,330	193,728.75	199,330	198,069.48	199,330	196,713.00	208,050	
Western Irrigation Agriculture Investigations	108,275	106,385.25	108,275	106,404.45	107,475	105,743.44	109,095	
Demonstrations on Reclamation Projects	[g]	.....	.....	.....	.....	.....	.....	
Investigations in Economic and Systematic Botany	33,100	31,581.62	33,100	31,239.07	35,500	32,989.66	45,380	

Cotton Standards Investigations	.....	.....	.....	.....	.....	.....	.....	
Grain Standards Investigations	.....	.....	.....	.....	.....	.....	.....	
Farm Management Investigations	.....	.....	.....	.....	.....	.....	.....	
Logged-Off Land Investigations	.....	.....	.....	.....	.....	.....	.....	
Farm Demonstrations in Cotton Belt	.....	.....	.....	.....	.....	.....	.....	
Crop Technology Investigations	49,420	46,836.74	49,420	47,353.71	48,920	47,453.81	54,340	
Paper Plant Investigations	.....	.....	.....	.....	.....	.....	.....	
Biophysical Investigations	34,024	32,178.62	33,952	33,461.72	33,952	33,208.16	35,812	
Plant Disease Investigations; Pathological Collections; Plant Disease Survey (Pathological Laboratory)	81,000	79,146.70	81,000	75,261.94	90,000	85,321.04	108,440	
Fruit Disease Investigations	124,775	121,170.16	128,325	128,146.20	135,325	134,858.43	142,705	
Citrus Canker Investigations	53,280	45,681.42	48,130	38,734.50	48,630	43,196.88	45,000	
Cereal Disease Investigations	.....	.....	.....	.....	.....	.....	.....	
Investigations of Disease of Cotton, Potatoes, Truck Crops, Forage Crops, Drugs and Related Plants	[h] 150,080	[i] 143,929.13	[j] 140,080	133,772,26	138,450	133,652.54	[k] 167,570	
Investigations in Forest Pathology	96,095	93,765.67	108,095	107,724.01	108,095	108,012.76	140,000	
White Pine Blister Rust Investigations	333,280	325,363.55	348,280	334,379.92	368,280	366,382.27	471,520	
Experimental Gardens and Grounds	13,480	12,906.00	15,000	14,807.80	14,500	13,839.25	89,500	
Arlington Experiment Farm	27,215	26,427.13	27,215	26,405.00	27,000	24,437.93	57,000	
General Administrative Expenses	27,660	21,859.08	26,400	23,993.57	26,000	25,055.82	[l] 193,120	
Salaries	599,460	582,907.02	581,211	574,073.85	575,000	571,042.11	[l]	
Totals	$3,878,655	$3,758,524.85	$3,881,073	$3,762,917.84	$3,908,055	$3,809,456.98	$3,945,425	

[a] To June 30, 1927.
[b] Soil Fertility and Soil Bacteriology Investigations transferred to Bureau of Chemistry and Soils.
[c] New and Rare Seed Distribution included under Foreign Seed and Plant Introduction.
[d] Includes $31,000 available through 1926, for disease-resistant sugar-cane breeding, of which $8000 was for greenhouse construction at the Arlington Farm and $16,000 for land and buildings for station at Canal Point, Fla. Excludes allotment of $100,000 from Commerce appropriation for rubber-plant investigations.
[e] Including $30,502.80 expended during the fiscal year 1926 for disease-resistant sugar-cane breeding.
[f] Includes $7500 for experiments in cotton seed interbreeding and $50,000 for rubber-plant investigations.
[g] Transferred to Extension Service.
[h] Includes $10,000 for investigation of nail head rust of tomatoes and $10,000 for investigation of alfalfa diseases, the latter available through 1926.
[i] Includes $8984.58 expended during the fiscal year 1926 for investigation of alfalfa diseases.
[j] Includes $10,000 for investigation of nail head rust of tomatoes.
[k] Includes $7500 available 1927 and 1928, for investigation of root-rot of cotton.
[l] Beginning 1928 appropriations for field service projects include personal services; the amount previously carried under "Salaries" is divided between the several appropriations for field projects and the appropriation "General Administrative Expenses"; the appropriation "General Administrative Expenses" for 1928 includes personal services in the District of Columbia only. See H. rep. 1619, 69 Congress, on Agric. appropriation bill, 1928.

APPENDIX 7

BIBLIOGRAPHY[1]

Explanatory Note

The bibliographies appended to the several monographs aim to list only those works which deal directly with the services to which they relate, their history, activities, organization, methods of business, problems, etc. They are intended primarily to meet the needs of those persons who desire to make a further study of the services from an administrative standpoint. They thus do not include the titles of publications of the services themselves, except in so far as they treat of the services, their work and problems. Nor do they include books or articles dealing merely with technical features other than administrative of the work of the services. In a few cases explanatory notes have been appended where it was thought they would aid in making known the character or value of the publication to which they relate.

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